

**McKINLEYVILLE
COMMUNITY SERVICES DISTRICT**

Gregory Orsini
General Manager

David Couch
President of the Board of Directors

1 October 2014

TO: ALL PROSPECTIVE BIDDERS

FROM: INVITATION TO BID
McKINLEYVILLE TEEN CENTER
CIP # 117

Ladies and Gentlemen:

Enclosed please find an invitation to bid with a bid form, a sample contract and job specification.

Sealed responses are to be received no later than **2:00 PM PST, FRIDAY, NOVEMBER 14, 2014**. Please return your Bid in a sealed envelope with the Bid number and the date and time of bid opening.

Mail or deliver your response by the above date and time to the following address:

**McKinleyville Community Services District
c/o Jason Sehon
Teen Center Bid # 117
1656 Sutter Rd.
McKinleyville, CA 95519**

****PRE-BID CONFERENCE****

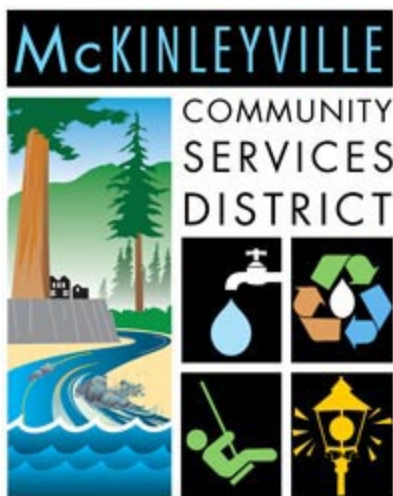
There will be a pre-bid conference on **WEDNESDAY, OCTOBER, 15, 2014 AT 10:00 AM, PST**. The walk through will begin at the **lobby area of the adjacent Activity Center located at 1705 Gwin Rd., McKinleyville, CA 95519**. This will be your opportunity for an on-site visit. Attendance at the pre-bid conference is strongly encouraged.

Architect's estimate of Construction Cost: \$1,850,000.

If you have any further questions, please contact me at (707) 839-9003.

Sincerely,

Jason Sehon
Parks & Recreation Director



BID # 117

McKINLEYVILLE TEEN CENTER

THIS IS A PUBLIC WORKS PROJECT

**McKINLEYVILLE COMMUNITY SERVICES DISTRICT
1656 SUTTER RD.
McKINLEYVILLE , CA. 95519**

**Contact: Jason Sehon
707-839-9003
jason@mckinleyvillecsd.com**

Request for Bid No. 117

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1.0 KEY ACTION EVENTS AND DATES

Listed below are the events and dates for this Request for Bid. All dates are predicted on the issue date of the Request for Bid.

EVENT #	DESCRIPTION	DATE
1.	Release of Request for Bid	Wednesday October 1, 2014
2.	Pre-Bid Conference	Wednesday October 15, 2014
3.	Last day for contractors to submit questions (For clarification prior to submitting Bid)	Friday November 7 1, 2014
4.	Last day for District to answer questions	Wednesday November 12, 2014
5.	Bid is due no later than 2:00, PM, PST	Friday, November 14, 2014
6.	Award of Contract	January 2015

2.0 SUBMITTAL OF BIDS

Sealed bids will be received at the Park & Recreation office, at 1656 Sutter Rd., McKinleyville CA. 95519, until **2:00 PM, PST, FRIDAY, NOVEMBER 14, 2014** and will be publicly opened at that time.

ALL MAILED BIDS SHALL BE ADDRESSED AS FOLLOWS:

**Bid No. 117
McKinleyville Teen Center
McKinleyville Community Services District
c/o Jason Sehon
1656 Sutter Rd.
McKinleyville, CA 95519**

The envelope shall also have stated therein the name and address of the submitting firm.

HAND DELIVERED COURIER OR PACKAGE DELIVERY SERVICE SHALL BE DELIVERED DIRECTLY TO:

**Bid No. 117
McKinleyville Teen Center
McKinleyville Community Services District
c/o Jason Sehon
1656 Sutter Rd.
McKinleyville, CA 95519**

BIDS WILL NOT BE ACCEPTED THEREAFTER. ALL BIDS RECEIVED AFTER SAID TIME/DATE WILL BE TIME STAMPED AND RETURNED UNOPENED TO THE BIDDER.

THE DISTRICT DOES NOT ACCEPT BIDS SUBMITTED BY FAX OR BY EMAIL

3.0 STANDARD TERMS AND CONDITIONS

1. **SUBMITTAL OF BIDS:** Sealed bids must be received in the Parks & Recreation Office of the McKinleyville Community Services District at 1656 Sutter Rd., McKinleyville, CA 95519 by **2:00 PM, PST on FRIDAY, NOVEMBER 14, 2014**. All bids received after said time and date will be timed-stamped and returned unopened to the submitter. The District will not accept bids submitted by fax.

Bidders must submit 2 copies of Bid, one (1) copy clearly marked "ORIGINAL" and one (1) copy, clearly marked "COPY".

2. **BASIS FOR SELECTION AND CONDITIONS:**

The responsiveness, competency and responsibility of bidders and of their proposed subcontractors will be considered in making the award of contract. Any bidder before being awarded a contract may be required to furnish evidence satisfactory to the District that bidder and their proposed subcontractors have sufficient means and experience in the type of work called for to assure completion of the contract in a satisfactory manner. The District reserves the right to reject the bid of any bidders as not responsible and not qualified to do the particular work under consideration who have previously failed to perform properly or to complete on time contracts with the District of a nature similar to this project. Other factors that may be considered by the District to determine a responsible bid and the overall capability of the bidder to satisfactorily complete the work under consideration may include, but are not limited to: insufficient experience, experience on other public projects, experience doing the same type of work, length of tenure and capacity with bonding or insurance company, financial stability, and whether a bidder has been terminated on other projects.

A responsive bid is one that meets all terms, conditions, and specifications of the bid. The bid must comply with the content requirements of the bid documents. The bidder must perform and do what the bid documents and contract required and said they must do, whether it be pricing in a certain way, attending a mandatory pre-bid conference, providing bonds, etc. Other examples where a bid might be declared and found to be non-responsive include:

- Bid is substantially incomplete
- Bid is not signed
- Bid is delivered late
- No acknowledgement of critical addenda
- Significant discrepancies appear in the response

A responsive bid conforms to bid specifications. However, a bid which substantially conforms, though not strictly responsive, to a call for bids may be accepted if the variance cannot have affected the amount of the bid or given a bidder an advantage or benefit not allowed other bidders or, in other words, if the variance is inconsequential. The District reserves the right to reject any and all bids or alternatives and waive any informality or irregularity in the bids or in the bidding, and to determine responsiveness and responsibility of bidder, including but not limited to those areas mentioned above.

3. **EXAMINE SPECIFICATIONS:** Bidders shall thoroughly examine and be familiar with the specifications. The failure or omission of any Bidder to receive or examine any

form, instrument, addendum or other document or become acquainted with all existing conditions shall in no way relieve any bidder from any obligations with respect to Bidder's offer or to the contract. The submission of a Request for Bid shall be taken as prima facie evidence of compliance with this section.

Should a Bidder find discrepancies in or omissions from the drawings or other contract document, or should be in doubt as to their meaning, he shall at once **notify the District's Project Manager, Jason Sehon**, who is the Owner's representative. The Owner will send written instructions to all bidders. Neither Owner nor its representative will be responsible for any oral instructions. No interpretations will be issued later than three (3) calendar days prior to the bid date so that all inquiries can be answered in writing and distributed to all bidders in the form of addendum to the contract in ample time before the bid opening date.

4. **SPECIFICATION CHANGES:** The District may, during the Request for Bid period, advise the Bidder in writing of any additions, omissions or alterations in the specifications. All such changes shall be included in the Request for Bid and become part of the specifications as if originally submitted.
5. **AMENDMENTS:** No one is authorized to amend any of the Request for Bid requirements in any respect, by an oral statement, or to make any representation or interpretation in conflict with the provisions herein. If necessary, supplementary information in addendum form will be prepared and posted on the District's website or other planholding offices. It is the Bidder's responsibility to indicate acknowledgement, sign, and return addendums with their response. The District reserves the right to reject any responses deemed to be non-responsive.

Failure of Bidder to submit signed addendum(s) with their Bid may be cause for rejection.

Any exceptions taken to this Bid shall be clearly stated in writing.

6. **PRE-BID CONFERENCE / WALK THROUGH:** A pre-bid conference and walk through will be held on **Wednesday October 15, 2014 at 10:00 am**. **Prospective Bidders shall meet at the adjacent Activity Center located at 1705 Gwin Rd.** **The attendance of Bidder's representative is strongly encouraged.**

7. **SITE INSPECTION:** Each bidder shall have examined the work site before bidding and familiarize himself with the local conditions under which the work is to be performed, and correlated his observations with the requirements of this Request for Bid's specifications, as applicable. No variations or allowances from the contract sum will be made because of lack of such examination.

Should concealed or unknown conditions be encountered in the performance of the agreed upon work, when conditions appear to Bidder to be at variance with the specifications, the Bidder shall immediately seek a clarification from the District who shall investigate the conditions and proceed in a way that is appropriate to the circumstances.

8. **BID WITHDRAWAL:** Any Bidder may withdraw his bid, either personally or by written request, at any time prior to the scheduled opening time of receipt of bids.
9. **OPENING OF BIDS:** Bids will be opened and read at or about the time set in the advertised Notice Inviting Bids. Bidders, or their representatives, and other interested persons may be present at the opening of bids.
10. **AWARD OR REJECTION OF BIDS:** The contract, if awarded, will be awarded to the lowest responsible bidder based on the lowest total bid received and in compliance with these instructions and the advertised Notice Inviting Bids, provided the bid is reasonable and it is to the interest of the Owner to accept it. The competency and the responsibility of bidders and of their proposed subcontractors will be considered in making the award of contract. Any bidder before being awarded a contract, may be required to furnish evidence satisfactory to the Owner that he and his proposed subcontractors have sufficient means and experience in the type of work called for to assure completion of the contract in a satisfactory manner. The owner reserves the right to reject the bid of any bidders who have previously failed to perform properly or to complete on time, contracts with the Owner of a nature similar to this project. The Owner reserves the right to reject any or all bids or alternates and waive any informality or irregularity in the bids or in the bidding.

The District reserves the right to reject any or all bids or parts thereof. False, incomplete or unresponsive statements in connection with a bid submittal maybe sufficient cause for rejection. The District will be the sole judge in making such determinations.

11. **ALL BID DOCUMENTS PART OF FINAL CONTRACT:** Any bid documents, letters, and materials submitted by the Bidder shall be binding and included as part of the final contract. Unauthorized conditions, limitations or provisions attached to this bid may render it non responsive and may cause its rejection.
12. **PUBLIC RECORD**
All bids become property of the District. All bids, including the accepted bid and any subsequent contract become public records per the requirements of the California Government Code, Sections 6250-6270, "California Public Records Act". Proprietary material must be clearly marked as such. Pricing and service elements of the successful bid are not consider proprietary information.

The District will treat all information submitted in a bid as available for public inspection once the District has selected a contractor. If you believe that you have a legally

justifiable basis under the California Public Records Act (Government Section 6250 et. seq.) for protecting the confidentiality of any information contained within your bid, you must identify any such information, together with the legal basis of your claim in your bid. In order for the District to assess confidentiality of any such information on your behalf, you must request, execute and submit a District-prepared written agreement to defend and indemnify the District for any liability, costs, and expenses incurred in asserting such confidentiality as part of your bid. The final determination as to whether the District will assert your claim of confidentiality on your behalf shall be sole discretion of the District.

13. **EQUAL EMPLOYMENT OPPORTUNITY:** The Bidder awarded this contract shall not discriminate against any employee and applicant for employment because of race, color, religion, sex, age, marital status, or national origin. Such action shall include but not be limited to the following: employment upgrading, demotion or transfer, rate of pay or other forms of compensation and selection for training, including apprenticeship. In the event of Bidder non-compliance with the provisions of this clause, the contract may be canceled, terminated or suspended in whole or in part and the Bidder may be declared ineligible for further District contracts. The rights and remedies of the District provided in this paragraph shall not be exclusive but are in addition to any remedies provided by law.
14. **DRUG FREE WORKPLACE:** Bidder shall comply with the provisions of Government Code section 8350 et seq., otherwise known as the Drug-Free Workplace Act.
15. **CONTRACT PERFORMANCE:** The performance of the contract resulting from this bid shall be governed by and interpreted under and construed according to the laws of the State of California. Venue is Humboldt County.
16. **NOTICE:** Any notice, demand, request, or consent approval required to be given pursuant to the terms and conditions hereof shall be in writing, and shall be effected by one of the following methods: personal delivery, prepaid Certified First-Class Mail, or prepaid Priority Mail with delivery confirmation. Unless otherwise designated in writing by either party, such notice shall be mailed to the addresses shown below. :

McKinleyville Community Services District
1656 Sutter Rd.
McKinleyville, CA 95519
Attention: JASON SEHON

17. **INDEPENDENT CONTRACTOR:** Bidder agrees that any and all persons performing any services and/or work whatsoever contemplated by this bid and/or related or incidental thereto, shall be an employee of the Bidder and Bidder shall, by way of example but not by way of limitation, withhold federal and state income taxes as well as the required and all regulations regarding employees, and Bidder shall also pay and/or contribute its required share as the employer of said persons.

Bidder acknowledges the fact that it is an independent contractor and is in no way to be construed as an employee of the District, nor are any of the persons employed by the Bidder to be so construed.

18. **INDEMNIFICATION:** Bidder shall, at its expense, defend, indemnify and hold harmless the District of San Joaquin and its employees, officers, directors, contractors and agents from and against any losses, liabilities, damages, penalties, costs, fees, including

without limitation reasonable attorneys' fees, and expenses from any claim or action, including without limitation for bodily injury or death, to the extent caused by or arising from the active and/or passive negligence or willful misconduct of Bidder, its employees, officers, agents or Subcontractors.

19. **INSURANCE REQUIREMENTS:** During the term of this Agreement, Bidder will carry and maintain in full force, insurance of the following types and minimum amounts with a company or companies as are acceptable to District, insuring Bidder while Bidder is performing duties under this Agreement.

Bidder agrees that Bidder is responsible to ensure that the requirements set forth in this article/paragraph are also be met by Bidder's subcontractors/consultants who provide services pursuant to this Agreement. Copies of insurance certificates shall be filed at the District's administrative office.

- A. **Workers' Compensation** – A program of Workers' Compensation Insurance or a state-approved self-insurance program in an amount and form to meet all applicable requirements of the Labor Code of the State of California.
- B. **Comprehensive General Liability Insurance** – The policy shall have combined single limits for bodily injury and property damage of not less than one million dollars (\$1,000,000).
- C. **Automobile Liability** – Bidder agrees to defend, hold harmless and indemnify the District for any and all liabilities associated with the use of any automobiles in relation to tasks associated with this Agreement.
- D. **Additional Named Insured** – All policies, except for workers' Compensation shall contain additional endorsements naming the District and its officers, employees, agents and volunteers as additional insured with respect to liabilities arising out of performance of services.
- E. **Policies Primary and Non-Contributory** – All policies required above are to be primary and non-contributory with any self-insurance programs carried or administered by the District.
- F. **Proof of Coverage** – Bidder shall immediately furnish certificates of insurance to the District's Project Manager evidencing the insurance coverage, including endorsements for each separate policy, prior to the commencement of performance of services, which certificates shall provide that such insurance shall not be terminated or expire without thirty (30) days written notice to the District and Bidder shall maintain such insurance from the time Bidder commences performance of services hereunder until the completion of such services.
- G. **Payment Withheld** – If Bidder does not obtain the described insurance, or if District is not furnished at the time specified with the requisite insurance certificates, or if the described insurance is terminated, altered, or changed in a manner not acceptable to District, District may withhold payments to the Bidder or terminate this Agreement.

- H. **Liability** – Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve Bidder from liability in excess of such coverage, nor shall it preclude the District from taking such other actions as available to it under any other provision of this Agreement or otherwise in law.

20. **PERFORMANCE AND PAYMENT BONDS:** The Bidder shall furnish the District, within ten (10) days (or as otherwise specified) of the execution of a contract **original** performance and payment bonds as follows:

(a.) **Faithful Performance Bond.** Said bond shall be in an amount equal to one hundred percent (100%) of the contract price, shall be for the faithful performance of the contract, shall be approved by the District, and shall be secured from a surety or sureties satisfactory to said District.

(b.) **Payment Bond for Public Works.** The Bidder shall furnish a separate surety bond in an amount at least equal to one hundred percent (100%) of the contract price as security for the payment of all persons for furnishing materials, provisions, provender, or other supplies, or items, used in, upon, for or about the performance of the work contracted to be done, or for performing any work or labor thereon of any kind, and for the payment of amounts due under the Unemployment Insurance Code with respect to such work or labor in connection with the Contract, and for the payment of a reasonable attorney's fee to be fixed by the court in case suit is brought upon the bond.

21. **WARRANTY:** In addition to any guarantees otherwise required, the Bidder shall guarantee his work free from defects and material and workmanship for a period of one year from the date of acceptance by the District and shall agree to replace at his own expense any said defect that may occur within that time. Such guarantee is in addition to, and not in lieu of the District's rights to enforce this agreement in all respects, and the District's right on all other guarantees and warranties that may be required by the Request for Bid.

By accepting the guarantees required herein, the District shall not be deemed to have waived any warranty or buyer protection implied, required an/or provided by law, not to have altered any applicable statute of limitations regarding enforcement of any right of the District created by this agreement or otherwise.

22. **INVOICING / PROGRESS PAYMENTS / PAYMENT:** Original invoices are to be sent to the McKinleyville Community Services District, C/o Jason Sehon, 1656 Sutter Rd., McKinleyville CA 95519. All invoices must reference the Purchase Order number.

When progress payments are due, it is the responsibility of the Bidder to send a **duplicate invoice** to the department to which services were provided. The department will then approve completion of and payment for services provided.

Payments will be made within thirty days after the District's acceptance of the work performed and receipt of the Bidder's invoice. In the event that the work site and/or adjacent premises are damaged during the conduct of the work agreed to, or as otherwise deemed necessary to protect District interests as determined by the Purchasing Agent, a reasonable amount of any payment otherwise due may be withheld

by the District until such time as satisfactory settlement is reached between all parties involved.

The District shall withhold ten percent (10%) of progress payments until thirty-five (35) days after notice of recordation is filed.

23. **PAYMENT DISCOUNTS:** Any discount offered by the Bidder must allow for payment after receipt and acceptance of services, material or equipment and correct invoice, whichever is later. In no case will the discount be considered in the evaluation of Bids that requires payment in less than 30 days.

24. **LABOR CODE SECTION:**

Signature on your bid response (for electrical projects only) shall indicate that the electricians who work for the C-10 contractor are certified pursuant to the Labor Code Sections 3099 and 3099.2, and subject to providing proof of the electrician's certification upon request.

ATTACHMENT A - IDENTIFICATION SHEET

RESPONDENT TO COMPLETE AND RETURN WITH BID

Type or print the following information:

Company: _____

Address: _____

(City) (State) (Zip)

Name: _____

Title: _____

Telephone: () _____ Fax: () _____

MY BID IS ATTACHED AND IDENTIFIED AS:

Years in business: _____

Number of employees: _____

Name of Insurance carriers: _____

Public Liability: _____ Expires: _____

Workers' Compensation: _____ Expires: _____

NOTE: Proof of maintenance of adequate insurance will be required before an award will be made to CONTRACTOR. If not already on file with the District, be sure it accompanies your Bid response.

The undersigned, having carefully read and examined the contract documents, and being familiar with (1) all the conditions applicable to the work for which this bid is submitted; (2) with availability of the required equipment, materials and labor hereby agrees to provide everything necessary to complete the work for which this bid is submitted in accordance with the Bid documents for the amounts quoted herein and further agrees that if this bid is accepted, within five (5) days after the contract is presented for acceptance, will execute, and mail a signed contract to the District.

Signature

Date

ATTACHMENT B - REFERENCES

SIMILAR CONTRACTS PERFORMED: List below contracts under which the Contractor has provided similar services during the past three (3) years.

#1

FIRM NAME: _____

ADDRESS: _____

PHONE NO.: _____ **EMAIL:** _____

CONTACT PERSON: _____

DATE OF CONTRACT: _____ thru _____

#2

FIRM NAME: _____

ADDRESS: _____

PHONE NO.: _____ **EMAIL:** _____

CONTACT PERSON: _____

DATE OF CONTRACT: _____ thru _____

#3

FIRM NAME: _____

ADDRESS: _____

PHONE NO.: _____ **EMAIL:** _____

CONTACT PERSON: _____

DATE OF CONTRACT: _____ thru _____

ATTACHMENT C

PUBLIC CONTRACT CODE SECTION

In accordance with Public Contract Code Section 10162, the Bidder shall complete, under penalty of perjury, the following questionnaire.

Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state or local government project because of a violation of law or a safety regulation?

Yes _____ No _____

If the answer is yes, explain the circumstances in the following space.

PUBLIC CONTRACT SECTION 10232 STATEMENT

In accordance with Public Contract Code Section 10232, the Contractor hereby states under penalty of perjury, that no more than one final unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two year period because of the Contractor's failure to comply with an order of a federal court, which orders the Contractor to comply with an order of the National Labor Relations Board.

BUSINESS AND PROFESSIONS CODE SECTION 7028.15 STATEMENT

In accordance with Business and Professions Code Section 7028.15, the Contractor hereby states that all representations made herein are made under penalty of perjury.

ATTACHMENT C (Continued)

NONCOLLUSION AFFIDAVIT

(Title 23 United States Code Section 112 and Public Contract Code Section 7106)

In accordance with Title 23, United States Code Section 112, and Public Contract Code 7106, the bidder declares 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 submit 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.

NOTE: The above Noncollusion Affidavit is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Noncollusion Affidavit.

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**ATTACHMENT D –
COST CERTIFICATION
FOR CONSTRUCTION PROJECTS**

McKINLEYVILLE COMMUNITY SERVICES DISTRICT
1656 Sutter Rd.
McKinleyville, CA 95519

Dear Project Manager:

Having reviewed the contract documents and the site(s) of the work, the undersigned hereby proposes to furnish all work, labor, materials, transportation, equipment and services necessary, to complete the work, including State of California and local sales or use taxes, license or permit fees, if any, for the **McKinleyville Teen Center Project**, for the sum of _____ Dollars (\$_____).

Costs for alternates, if required, shall be included in the Bid Cost Summary.

If awarded the contract, work will commence on the first working day following receipt from the District of the Notice to Proceed. Work to be completed in 270 calendar days.

All bids for construction work shall be presented under SEALED COVER and shall be accompanied by one of the following forms of bidder's security (Public Contract Code 20129).

Enclosed please find a () Cash Deposit; () Cashier's Check, () Certified Check, or () Surety Bid Bond (Check as appropriate) of the _____

(NAME OF SURETY IF BID BOND IS SUBMITTED)

in an amount not to be less than ten percent (10%) of the amount of bid. If the enclosure is a check or bond, it is made payable to the McKinleyville Community Services District.

The undersigned agrees that the enclosed cash deposit, cashier's check, certified or surety bond accompanying this bid, shall be left on deposit with the District, that its amount is the measure of the liquidated damages which the District will sustain by the default of the undersigned through failure to execute and deliver the above agreement and any required bonds within ten (10) calendar days of written notice of the award of the contract and that the money or surety bond so deposited by the Contractor shall be collectible and become the property of the District in case such default.

ATTACHMENT D – COST CERTIFICATION FOR CONSTRUCTION PROJECTS (Continued)

Listed hereunder is the name(s) of each subcontractor and the address of the mill, shop or office of each subcontractor who will perform work or labor or render service to the undersigned in or about the construction of the work hereinabove described in excess of one-half of one percent of the total bid and the portion of said work which will be done by each subcontractor, if the contract for the said work is awarded to the undersigned. (Attach additional sheet if necessary and note attachment on this page.) (See Government Code Section 4100-4113.)

<u>Name of Subcontractor</u>	<u>Address</u>	<u>Percentage of Work to be Performed</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(Copy this sheet if more space needed)

By submission of a bid, a bidder attest to having possession of a duly issued valid contractor's license issued by the State of California. Such license authorizes a bidder to contract to perform type of work required by the specifications. Should the bidder fail to provide below, the number and classification of bidder's State of California Contractor's License, the Owner may reject this bid.

CONTRACTOR: _____

BY: _____

TITLE: _____

MAILING ADDRESS: _____

(City)

(State)

(Zip)

TELEPHONE NUMBER: _____

STATE OF CALIFORNIA LICENSE NO.: _____

STATE OF CALIFORNIA LICENSE CLASSIFICATION: _____

Contractor's Signature

Date

ATTACHMENT E – BID FORM

REQUEST FOR BID #117 BID FORM

DESCRIPTION	COST
McKinleyville Teen Center, CIP 117	
TOTAL BID (in numbers	
TOTAL BID (in words)	

ADDENDA

Bidder acknowledges receipt of the following addendum (if issued)):

Addendum 1: _____
Addendum 2: _____
Addendum 3: _____
Addendum 4: _____

Respectfully submitted, (Legal Name of Firm)

Dated

Signature of Authorized Representative

_____(Seal)
(If Bidder is a corporation, show State in which incorporated.)

The full names and post office addresses of all persons and parties interested in the foregoing Bid as principals are as follows:

(NOTICE): Give first and last names in full; in case of corporation, give names of President, Secretary, Treasurer, and Manager, and in case of partnerships and joint ventures, give names and Post Office addresses of all the individual members.

ATTACHMENT E – BID FORM (Continued)

REQUEST FOR BID #117 BIDDER'S BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT WE _____
as PRINCIPAL, and _____

as SURETY are held; and firmly bond unto the McKinleyville Community Services District in the penal sum of TEN PERCENT (10%) OF THE TOTAL AMOUNT OF THE BID of the Principal above named, submitted by the Principal to the McKinleyville Community Services District for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made to the McKinleyville Community Services District to which the bid was submitted, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by those presents. In no case shall the liability of the surety hereunder exceed the sum of \$ _____.

THE CONDITION OF THIS OBLIGATION IS SUCH,

THAT, WHEREAS, the Principal has submitted the above mentioned bid to the McKinleyville Community Services District for certain construction specifically described as follows, for which bids are to be opened at the McKinleyville Community Services District, 1656 Sutter Rd. McKinleyville, CA, 95519:

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

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____ day of _____, 2014.

_____(Seal)

_____(Seal)

_____(Seal)

_____(Seal)

Address: _____

Address: _____

NOTE: Signatures of those executing for the surety must be properly acknowledged. Any additional costs that the Bidder identifies as required items associated with this project that were not requested in the Bid must be listed and priced out and included in the TOTAL COST.

Bid pricing shall remain valid for sixty (90) days from Bid opening date.

EXHIBIT A – PERFORMANCE BOND

Know all Men by These Presents:

THAT WHEREAS, McKinleyville Community Services District, has awarded to _____, as principal, hereinafter designated as the "CONTRACTOR," a contract for the work described as follows:
_____.

AND WHEREAS, the CONTRACTOR is required to furnish a bond in connection with said contract guaranteeing the faithful performance thereof.

NOW THEREFORE, we the undersigned CONTRACTOR and Surety, an admitted Surety insurer pursuant to Code of Civil Procedure Section 995.120, are held and firmly bound unto McKinleyville Community Services District, in the sum of _____ DOLLARS (_____), to be paid to the said McKinleyville Community Services District, its successors and assigns; for which payment, will and truly to be made, we bind ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally, firmly by these presents.

THE CONDITION of this obligation is such:

That if the above CONTRACTOR, their 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 the foregoing contract and any alteration thereof made as therein provided, on his or their part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the McKinleyville Community Services District its officers and agents, as therein stipulated, then this obligation shall become and be null and void, otherwise it shall be and remain in full force and virtue.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed there under, or the specifications accompanying the same, shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work, or to the Specifications. All terms and conditions as set forth in the General Conditions, as supplemented, to the contract are incorporated by reference and Surety acknowledges that it is bound thereby, including the disputes clauses(s) therein.

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

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this
_____ day of _____ 2014.

_____(Seal)
Name of Surety

CONTRACTOR

By:

Attorney-in-fact

EXHIBIT B – PAYMENT BOND

Know all Men by These Presents:

THAT WHEREAS, McKinleyville Community Services District, has awarded to _____, as principal, hereinafter designated as the "CONTRACTOR," a contract for the work described as follows:

_____.

AND WHEREAS, the CONTRACTOR is required by the provisions of Chapter 7, Title 15, Part 4, Division 3, Section 3247 et seq., Civil Code, to furnish a bond in connection with said contract, as hereinafter set forth.

NOW THEREFORE, we the undersigned CONTRACTOR and Surety, are held and firmly bound unto McKinleyville Community Services District for the sum of _____ (_____). Said sum being determined in accordance with the provisions of Section 3248 of the Civil Code, 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 the above CONTRACTOR, their heirs, executors, administrators, successors or assigns, or SUBCONTRACTOR'S, shall fail to pay any materials, provisions, provender or other supplies or teams, implements or machinery, 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 Act with respect to such work or labor, as required by the provisions of Chapter 7, Title 15, Part 4, Division 3 of the Civil Code, and provided that the claimant shall have complied with the provisions of said Code, the surety or sureties hereon will pay for the same in an amount not exceeding the sum specified in this bond, otherwise the above obligation shall be void. In case suit is brought upon this bond the said surety and/or sureties will pay a reasonable attorney's fee to be fixed by the court.

This bond shall insure to the benefit of any and all persons, companies or corporations entitled to file claims under Section 3181 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in anyway affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this ____day of _____, 2014.

CONTRACTOR

_____(Seal)

Name of Surety

By _____
Attorney-in-fact

EXHIBIT C – REGULATIONS

10162. Disqualification, removal, etc. from federal, state or local government project; questionnaire; rejection of bid.

The department shall require from all prospective bidders the completion, under penalty of perjury, of a standard form of questionnaire inquiring whether such prospective bidder, any officer of such bidder, or any employee of such bidder who has a proprietary interest in such bidder, has ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law of a safety regulation, and if so to explain the circumstances.

A bid may be rejected on the basis of a bidder, any officer of such bidder, or any employee of such bidder who has a proprietary interest in from bidding on, or completing a federal, state, or local project because of a violation of law or a safety regulation.

7028.15. License required to submit bid to public agency; Exceptions.

- (a) It is a misdemeanor for any person to submit a bid to a public agency in order to engage in the business or act in the capacity of a CONTRACTOR within this state without having a license therefore, except in any of the following cases:
 - (1) The person is particularly exempted from this chapter.
 - (2) The bid is submitted on a state project governed by Section 10164 of the Public Code or on any local agency project governed by Section 20103.5 of Public Contract Code.
- (b) If a person has been previously convicted of the offense described in this section, the court shall impose a fine of 20 percent of the price of the contract under which the unlicensed person performed contracting work, or four thousand five hundred dollars (\$4,500), whichever is greater, or imprisonment in the COUNTY jail for not less than 10 days nor more than six months, or both.
- (c) This section shall not apply to a joint venture license, as required by Section 7029.1; however, at the time of making a bid as a joint venture, each person submitting the bid shall be subject to this section with respect to his or her individual licensure.
- (d) This section shall not affect the right or ability of a licensed architect, land surveyor, or registered professional engineer to form joint ventures with licensed CONTRACTOR'S to render services within the scope of their respective practices.
- (e) Unless one of the foregoing exceptions applies, a bid submitted to a public agency by a CONTRACTOR who is not licensed in accordance with this chapter shall be considered non-responsive and shall be rejected by the public agency. Unless one of the foregoing exceptions applies, a local public agency shall, before awarding a

contract or issuing a purchase order, verify that the CONTRACTOR was properly licensed when the CONTRACTOR submitted the bid. Notwithstanding any other provision of law, unless one of the foregoing exceptions applies, the registrar may issue a citation to any public officer or employee of a public entity who knowingly awards a contract or issues a purchase order to a CONTRACTOR who is not licensed pursuant to this chapter. The amount of civil penalties, appeal, and finality of such citation shall be subject to Sections 7028.7 to 7028.13, inclusive. Any contract awarded to, or any purchase order issued to, a CONTRACTOR who is not licensed pursuant to this chapter is void.

- (f) Any compliance or non-compliance with subdivision (e) of this section, as added by Chapter 863 of the Statutes of 1989, shall not invalidate any contract or bid awarded by a public agency during which time that subdivision was in effect.
- (g) A public employee or officer shall not be subject to a citation pursuant to this section if the public employee, officer, or employing agency made an inquiry to the board for the purposes of verifying the license status of any person or CONTRACTOR and the board failed to respond to the inquiry within three business days. For purposes of this section, a telephone response by the board shall be deemed sufficient.

EXHIBIT D – SAMPLE CONSTRUCTION CONTRACT

AGREEMENT BETWEEN THE MCKINLEYVILLE COMMUNITY SERVICES DISTRICT AND _____ PROVIDING FOR CONSTRUCTION SERVICES ASSOCIATED WITH ADD PROJECT NAME HERE

This AGREEMENT BETWEEN THE MCKINLEYVILLE COMMUNITY SERVICES DISTRICT AND _____ PROVIDING FOR CONSTRUCTION SERVICES ASSOCIATED WITH PROJECT NAME HERE (this “Agreement”), is entered into as of _____, 2014 (the “Effective Date”), between the McKinleyville Community Services District, a duly formed community services district pursuant to California Government Code § 6100, et seq. (hereinafter referred to as “District” or “MCSD”), and _____ (hereinafter “Contractor”). For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, MCSD and Contractor agree as follows:

AGREEMENT

1. Scope of Work

Contractor shall furnish to the District, upon its request, the Work set forth in the “Scope of Work” (hereinafter “Work”) described in “**Attachment A**”, which is attached hereto and incorporated by reference. The Work shall be performed in accord with the “Plans, Specifications and Drawings”, as further described in “**Attachment B**”. Requests by the District to Contractor to perform under this Agreement will be made by the General Manager of the District, or an authorized representative thereof. Work provided at the District’s request by Contractor under this Agreement will be performed in a manner consistent with the requirements and standards established by applicable federal, state and county laws, ordinances, regulations, and resolutions. Such laws, ordinances, regulations, and resolutions include, but are not limited to, those to which reference is made in this Agreement.

2. Term and Progress Schedule

The term of this Agreement shall be from MONTH ____, 2014, through MONTH ____, 2014, unless sooner terminated as provided below. The Work shall be weather-tight by MONTH ____, 2014, and completed within ____ days of the date following the District's provision of written Notice to Proceed to Contractor.

3. Standard of Care in Performing the Work

Contractor represents and warrants to the District each of the following:

- (i) Contractor is knowledgeable and experienced in providing services comparable to the Work, and will maintain all necessary licensure pursuant to Section 7 of this Agreement when performing the Work;
- (ii) The Work will be performed in a manner consistent with the level of care and skill ordinarily exercised by other professional contractors under similar circumstances in accordance with customarily accepted good and sound professional practices and procedures;
- (iii) Contractor and its agents, subordinates, and employees and any subcontractors performing Work under this Agreement shall perform every part of the Work hereunder in strict accordance with this Agreement, applicable federal, state, county and municipal laws, orders, rules, regulations and directives, including, but not limited to, EPA and OSHA regulations, environmental, health and safety laws, and laws pertaining to wages and other conditions of employment, as further set forth in this Agreement;
- (iv) Contractor shall be strictly responsible for the proper performance of the Work and for any loss or damage to the District or to others by reason of Contractor's failure to properly perform the Work;
- (v) The Contractor has carefully examined the Specifications, Plans and Drawings, and such Specifications, Plans and Drawings set forth in Attachment A2 are full and complete, and are sufficient to have enabled the Contractor to determine the cost of the work therein in order to enter into this Agreement;

(vi) The Specifications, Plans and Drawings are sufficient to enable Contractor to construct the Work outlined therein in accordance with applicable laws, statutes, building codes and regulations, and otherwise to fulfill all Contractor's obligations hereunder; and

(vii) The Contractor has visited the site, examined all conditions affecting the Work, and is fully familiar with all of the conditions thereon and affecting the same.

4. Contract Sum

A. Compensation and Progress Payments.

The District shall pay Contractor the amounts recited and in accordance with the timing intervals set forth in the "Bid Schedule" (set forth in "**Attachment B**") for the Work described in "Scope of Work" (set forth in Attachment A) which are performed by Contractor at the District's request. The total project cost shall not exceed the total amount for the entirety of the Work set forth in the Bid Schedule, unless otherwise authorized by the District in writing prior to Contractor incurring additional expenses. Payment intervals shall be in accord with paragraph 4.E. of this Agreement, below.

B. Travel and Per Diem.

Unless otherwise agreed by the parties, Contractor will not be paid or reimbursed for travel expenses or per diem which Contractor incurs in providing the Work requested by the District under this Agreement.

C. No Additional Consideration.

Except as expressly provided in paragraph 4.G. of this Agreement, below, Contractor shall not be entitled to, nor receive from the District, any additional consideration, compensation, salary, wages, or other type of remuneration in excess of the total amount set forth in the Bid Schedule set forth in "**Attachment A**" for services or work rendered under this Agreement. Specifically, Contractor shall not be entitled, by virtue of this Agreement, to consideration in the form of overtime, health insurance benefits, retirement benefits, disability retirement benefits, sick leave,

vacation time, paid holidays, or other paid leaves of absence of any type or kind whatsoever.

D. Limit Upon Amount Payable Under Agreement.

The total sum of all payments made by the District to Contractor for the Work performed under this Agreement shall not exceed amounts specified in the Bid Schedule (set forth in **Attachment A**) and/or any authorized adjustments made consistent with the terms and conditions of this Agreement (hereinafter referred to as "Contract Limit") and the Public Contract Code. The District expressly reserves the right to deny any payment or reimbursement requested by Contractor for services or work performed which is in excess of the Contract Limit.

E. Billing and Payment.

Contractor shall submit to the District, not more than once per month, an itemized statement of all the Work described in the Scope of Work, which were done at the District's request. The statement to be submitted will cover the period from the first day of the preceding month through and including the last day of the preceding month. All statements submitted in request for payment should identify the date on which the Work were performed and describe the nature of the Work which were performed on each day. Invoicing shall be informative and concise regarding work performed during that billing period. The District shall make payment to Contractor within thirty (30) days of receipt of an itemized statement, but shall retain ten percent (10%) of each such payment in accordance with Section 9203 of the Public Contract Code until the project is completed. Should Contractor produce incorrect invoices, the District shall withhold payment until corrected.

F. Federal and State Taxes.

(1) The District will not withhold any federal or state income taxes or social security from any payments made by the District to Contractor under the terms and conditions of this Agreement.

(2) The District shall withhold California State income taxes from payments made under this Agreement to non-California resident independent contractors when it is anticipated that total annual payments to Contractor under this Agreement will exceed one thousand four hundred ninety-nine dollars (\$1,499.00).

(3) Except as set forth above, the District has no obligation to withhold any taxes or payments from sums paid by the District to Contractor under this Agreement. Payment of all taxes and other assessments on such sums is the sole responsibility of Contractor. The District has no responsibility or liability for payment of Contractor's taxes or assessments.

(4) The total amounts paid by the District to Contractor, and taxes withheld from payments to non-California residents, if any, will be reported annually by the District to the Internal Revenue Service and the California State Franchise Tax Board.

G. Changes to Scope of the Work.

If at any time during the progress of the Work the District desires to make any additions to, alterations of, deviations or omissions from the Work, District shall have the right to do so to the extent permitted by the California Public Contract Code and the same shall in no way affect or make void this Agreement. No extra work shall be made except on the District's written request by change order ("Change Order"). All Change Orders will be in writing and signed by the District and the District's Engineer. Each Change Order shall identify the proposed change in the Work and will include a proposed basis for adjustment, if any, in the Bid Schedule. The District may prepare a Change Order without invalidating the Agreement, order changes in the Work within the general scope of the Agreement consisting of additions, deletions, or other revisions, with the Bid Schedule being adjusted accordingly. Any changes that decrease the cost of the Work shall be evaluated on a lump-sum basis and deducted from the sums set forth in the Bid Schedule set forth in Attachment A1. Any extra Work that increases the cost of the Work shall at District's option be evaluated (i) on a lump-sum basis, the amount thereof to be agreed on in writing before execution of the Work or (ii) on the basis of "Actual Necessary Cost" (defined below), plus ten percent (10%).

"Actual Necessary Cost" shall be limited to:

- (i) expenditures for materials, supplies, and labor (including foremen's wages) furnished by Contractor;
- (ii) additional cost to Contractor for insurance required because of authorized changes; and

- (iii) an allowance based on current market rental prices for the use of vehicles and equipment. The "Actual Necessary Cost" shall not include any allowance for Contractor's office expense, general superintendent, or other overhead or general expense.

Contractor shall not be entitled to compensation for any extra Work unless the District has issued a written Change Order designating in advance the amount of additional compensation to be paid for the extra Work prior to Contractor incurring the expense or performing the extra Work.

5. Work Schedule

Upon the issuance of a formal written "Notice to Proceed" from the District, Contractor's obligation is to perform, in a timely manner, the Work identified in the Scope of Work which are requested by the District. It is understood by Contractor that the performance of the Work will require a varied schedule. Contractor, in arranging its own schedule, will coordinate with the District to ensure that all Work requested by the District under this Agreement will be performed within the time frames set forth by the District in Attachment A. Contractor shall endeavor to perform the Work during normal business hours in order to limit the impacts of construction traffic and noise on surrounding property owners.

6. Guaranties and Warranties

A. Manufacturer's Specifications and Warranties—Assignment.

The Contractor shall assemble for the District's Architect and/or Engineer's approval and transmittal to the District three (3) complete copies in looseleaf binders of all operating and maintenance data from all manufacturers whose equipment is installed in the Work. The Contractor shall also prepare a checklist or schedule showing the type of lubricant to be used at each point of application, the intervals between lubrication for each item of equipment, and the routine maintenance tasks necessary to maintain each item of equipment. In addition, the Contractor shall secure and deliver to the District written warranties and guaranties from subcontractors, sub-subcontractors and suppliers bearing the date of Substantial Completion or some other date as may be agreed to by the District and stating the period of warranty.

B. Contractor's Warranty.

Contractor guarantees all equipment, material, supplies and Work furnished on the job against defective construction or workmanship for a period of one (1) year following recordation of a Notice of Completion on the Work for patent defects and for a period of ten (10) years following recordation of a Notice of Completion on the Work for latent defects, except when a longer guaranty is provided by the supplier or manufacturer of any equipment, material or supplies incorporated into the Work. Upon receipt of written notification from District that any Work is defective, Contractor shall immediately remedy, repair, or replace, without cost to District and to District's entire satisfaction, all such defective construction or workmanship. Contractor expressly agrees to act as coguarantor of any such equipment, material or supplies incorporated into the Work for the period during which any guaranty is effective. Contractor shall supply District with all warranty and guaranty documents relative to equipment and materials incorporated in the Work and guaranteed by the suppliers or manufacturers of such equipment and materials.

7. Required Licenses, Certificates and Permits

Any licenses, certificates, or permits required by federal, state, county, or municipal governments for Contractor to provide the Work described in Attachment A must be procured by Contractor and be valid at the time Contractor enters into this Agreement. Further, during the term of this Agreement, Contractor must maintain such licenses, certificates, and permits in full force and effect. Licenses, certificates, and permits may include, but are not limited to, driver's licenses, professional licenses or certificates, contractor's licenses, and business licenses. Such licenses, certificates, and permits will be procured and maintained in force by Contractor at no expense to the District. Contractor will provide the District, upon execution of this Agreement, with evidence of current and valid licenses, certificates and permits which are required to perform the Work identified in Attachment A. Where there is a dispute between Contractor and the District as to what licenses, certificates, and permits are required to perform the Work identified in Attachment A, District reserves the right to make such determination for purposes of this Agreement.

8. Office Space, Supplies, Equipment, Etc.

Contractor shall provide such office space, supplies, equipment, vehicles, reference materials, support services, and telephone service as is necessary for Contractor to provide the Work identified in Attachment A to this Agreement. The District is not obligated to reimburse or pay

Contractor for any expense or cost incurred by Contractor in procuring or maintaining such items. The costs and expenses incurred by Contractor in providing and maintaining such items is the sole responsibility and obligation of Contractor.

9. District Property

A. Personal Property of District.

Any personal property such as, but not limited to, protective or safety devices, badges, identification cards, keys, uniforms, etc., provided to Contractor by the District pursuant to this Agreement are, and at the termination of this Agreement remain, the sole and exclusive property of the District. Contractor will use reasonable care to protect, safeguard, and maintain such items while they are in Contractor's possession. Contractor will be financially responsible for any loss or damage to such items, partial or total, which is the result of Contractor's negligence.

B. Products of Contractor's Work and Services.

Any and all compositions, publications, plans, designs, specifications, blueprints, maps, formulas, processes, photographs, slides, video tapes, computer programs, computer disks, computer tapes, memory chips, films, audio-visual presentations, exhibits, reports, studies, patents, trademarks, copyrights, or intellectual properties of any kind which are created, produced, assembled, compiled by, or are the result, product or manifestation of, Contractor's services or work under this Agreement are, and at the termination of this Agreement remain, the sole and exclusive property of the District. At the termination of the Agreement, Contractor will convey possession and title to all such properties to District.

10. Workers' Compensation Insurance

Contractor shall provide workers' compensation insurance coverage, in the legally required amount, for all Contractor's employees utilized in providing Work pursuant to this Agreement. By executing a copy of this Agreement, Contractor acknowledges its obligations and responsibilities to its employees under the California Labor Code, and warrants that Contractor has complied and will comply during the term of this Agreement with all provisions of the California Labor Code with regard to its employees. Contractor, at the time of execution of this Agreement, will

provide the District with evidence of the required workers' compensation insurance coverage.

11. Public Work

A. Determination.

The Work to be provided by Contractor under this Agreement constitute a Public Work within the meaning of California Labor Code Sections 1720 and 1720.3. Accordingly, and as required by Section 1771 of the California Labor Code, Contractor and any subcontractor under him, shall pay not less than the general prevailing rate of per diem wages, and not less than the general prevailing rate of per diem wages for holiday and overtime work, to all workers employed in the execution of those Work described in Attachment A of this Agreement.

B. Prevailing Wage Rate.

The general prevailing rate of per diem wages applicable to each class of worker employed in the execution of the Work that constitute a Public Work described in this Agreement has been determined by the Director of the California Department of Industrial Relations (hereinafter referred to as "Director"). Copies of the Director's determination are on file at the McKinleyville Community Services District office, located at 1656 Sutter Road, McKinleyville, California, and are available to any interested party upon request.

C. Apprentices.

Pursuant to Section 1777.5 of the California Labor Code, properly registered apprentices performing services and work that constitute a Public Work, if any, shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he or she is employed, and shall be employed only at the work of the craft or trade to which he or she is registered..

D. Penalty for Non-Payment of Prevailing Wages.

Pursuant to Section 1775 of the California Labor Code, Contractor, and any subcontractor under him, shall as a penalty to the District, forfeit not more than fifty dollars (\$50.00) for each calendar day, or portion thereof, for each worker paid less than the general rate of per diem wages for the performance of services and work that constitute a Public Work, as

determined by the Director of Industrial Relations, for the work or craft for which the worker is employed in the performance of the Work provided under this Agreement that constitute a Public Work, except as provided by subdivision (b) of Section 1775, of the California Labor Code.

E. Payroll Records.

Pursuant to Section 1776 of the California Labor Code, Contractor, and any subcontractor under him, shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the performance of the Work requested by the District, as described in the Scope of Work of this Agreement.

F. Inspection of Payroll Records.

Contractor, and any subcontractor under him, shall comply with each of the additional requirements set forth in California Labor Code Section 1776, regarding: (1) the form of records; (2) the provision of records upon request to the District, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the California Department of Industrial Relations; and, (3) the inspection of records by the public.

G. Posting of Prevailing Wages at Job Sites.

Pursuant to California Labor Code Section 1773.2, Contractor shall post at each job site in connection with this Agreement a copy of the Director's determination of the general prevailing rate of per diem wages for each classification of work required in the execution of the Work described in Attachment A of this Agreement that constitute a Public Work.

H. Hours.

Pursuant to Section 1810 of the California Labor Code, the time of services of any worker employed by Contractor, or by any subcontractor under him, in the performance of the Work described in the Scope of Work of this Agreement that constitute a Public Work, is limited and restricted to eight hours during any one calendar day, and 40 hours during any one calendar week, except as otherwise provided by the California Labor Code.

I. Overtime.

Pursuant to California Labor Code Section 1815, the performance of the Work, as described in the Scope of Work of this Agreement that constitute a Public Work, by employees of Contractor, or employees of any subcontractor under him, in excess of eight hours per calendar day at not less than one and one-half (1 ½) times the basic rate of pay..

J. Records of Hours.

Contractor, and any subcontractors under him, shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by him or her in connection with the performance of the Work requested by the District, as described in the Scope of Work of this Agreement. The record shall be kept open at all reasonable hours to the inspection of the District and to the Division of Labor Standards Enforcement as required by Labor Code Section 1812.

K. Penalty for Violation of Work Hours.

Pursuant to California Labor Section 1813, Contractor, and any subcontractors under him, shall, as a penalty to the District, forfeit twenty-five dollars (\$25.00) for each worker employed by the respective contractor or subcontractor in the execution of the Work requested by the District that constitute a Public Work, as described in the Scope of Work of this Agreement, for each calendar day during which the worker is required or permitted to work more than eight hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of the California Labor Code.

12. Insurance

A. General Liability.

Contractor shall procure, and maintain during the entire term of this Agreement, a policy of general liability insurance which covers all the Work to be performed by Contractor under this Agreement. Such policy shall have a per occurrence combined single limit coverage of not less than one million dollars (\$1,000,000). Such policy shall not exclude or except from coverage any of the Work required to be performed by Contractor under this Agreement. The required policy of insurance shall be issued by an insurer authorized to sell such insurance by the State of California, and

have at least a “Best’s” policyholder’s rating of “A” or “A+”. Prior to commencing any work under this Agreement, Contractor shall provide the District: 1) a certificate of insurance documenting evidence of the required coverage; 2) an additional insured endorsement applying to the McKinleyville Community Services District, its agents, officers and employees; and, 3) a notice of cancellation or change of coverage endorsement indicating that the policy will not be modified, terminated, or canceled without thirty (30) days’ written notice to the District.

B. Business Vehicle.

Contractor shall procure and maintain in force throughout the duration of this Agreement, a business auto liability insurance policy with minimum coverage levels of one million dollars (\$1,000,000) per occurrence, combined single limit for bodily injury liability and property damage liability. The coverage shall include all Contractor-owned, non-owned, and hired vehicles employed by the Contractor in the performance of the Work requested by the District, as described in the Scope of Work ([**Attachment A**](#)). A certificate of insurance shall be provided to the District by Contractor prior to commencing any work under this Agreement. The policy shall maintain a provision prohibiting the cancellation or modification of said policy except upon thirty (30) days’ written notice to the District.

C. Deductibles and Self-Insured Retentions.

Any deductibles or self-insured retentions shall be declared by Contractor and must be approved by the District prior to Contractor commencing the Work requested by the District under this Agreement. If possible, the insurer shall reduce or eliminate such deductibles or self-insured retentions with respect to the District, its officials, officers, employees, and volunteers, or Contractor shall provide evidence satisfactory to the District guaranteeing payment of losses and related investigations, claim administration, and defense expenses.

D. Subcontractors.

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein for Contractor.

E. Unemployment, Disability, and Liability Insurance.

Contractor shall maintain, if so required by law, unemployment, disability and liability insurance in an amount to be determined by the State which is reasonable to compensate any person, firm, or corporation who may be injured or damaged by the Contractor in performing work associated with this Agreement.

13. Bonds

Contractor shall furnish and maintain a performance bond in an amount equal to one hundred percent (100%) of the Contract Limit. Contractor shall also furnish and maintain a labor and materials payment bond in the amount equal to one hundred percent (100%) of the Contract Limit. The bonds shall comply with the requirements of California Civil Code Section 3248 and must be issued by an "Admitted Surety Insurer." For purposes of this Agreement, an Admitted Surety Insurer means a corporate insurer or inter-insurance exchange to which the California State Insurance Commissioner has issued a certificate of authority to transact surety insurance in California, as defined in Section 105 of the California Insurance Code. Bonds shall be in a form acceptable to the McKinleyville Community Services District Counsel. The Attorney-in-Fact (resident agent) who executes the bonds on behalf of the surety company must attach a copy of his Power of Attorney as evidence of his authority. A notary shall acknowledge this Power of Attorney as of the date of the execution of the surety bond that it covers. If any surety becomes unacceptable to the District or fails to furnish reports as to its financial condition as requested by the District, Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the District and of persons supplying labor or materials in the prosecution of the work contemplated by this Agreement.

14. Status of Contractor

Contractor, its agents, officers, employees, and subcontractors shall constitute independent contractors, and not agents, officers, or employees of the District. Contractor, by virtue of this Agreement, has no authority to bind or incur any obligation on behalf of, or exercise any right or power vested in, the District, except as expressly provided by law or set forth in **Attachment A** of this Agreement. No agent, officer, or employee of the District is to be considered an employee of Contractor. It is understood by both Contractor and the District that this Agreement shall not under any circumstances be construed or considered to create an employer-employee relationship or joint venture.

As an independent contractor, Contractor: (1) shall determine the method, details, and means of performing the Work to be provided by Contractor under this Agreement (unless otherwise specified herein); (2) shall be responsible to the District only for the requirements and results specified in this Agreement and, except as expressly provided in this Agreement, shall be not be subjected to the District's control with respect to the physical action or activities of Contractor in fulfillment of this Agreement; and (3) Contractor, its agents, officers and employees are, and at all times during the term of this Agreement shall, represent and conduct themselves as independent contractors, and not as employees of District.

15. Defense and Indemnification

Contractor shall defend, indemnify, and hold harmless the District, its agents, officers, and employees from and against all claims, damages, losses, judgments, liabilities, expenses, and other costs, including litigation costs and attorney's fees, arising out of, resulting from, or in connection with, the performance of this Agreement by Contractor, or Contractor's agents, officers, employees, or subcontractors. Contractor's obligation to defend, indemnify, and hold the District, its agents, officers, and employees harmless applies to any actual or alleged personal injury, death, or damage or destruction to tangible or intangible property, including the loss of use. Contractor's obligation under this paragraph extends to any claim, damage, loss, liability, expense, or other cost which is caused in whole or in part by any act or omission of Contractor, its agents, employees, suppliers, or anyone directly or indirectly employed by any of them, or anyone for whose acts or omissions any of them may be liable. Contractor's obligation to defend, indemnify, and hold the District, its agents, officers, and employees harmless under the provisions of this paragraph is not limited to, or restricted by, any requirement in this Agreement for Contractor to procure and maintain a policy of insurance.

16. Records and Audit

A. Records.

Contractor shall prepare and maintain all records required by the various provisions of this Agreement, and federal, state, county, and municipal law, ordinances, regulations, and directions. Contractor shall maintain these records for a minimum of four (4) years from the termination or completion of this Agreement. Contractor may fulfill its obligation to maintain records as required by this paragraph by substitute photographs, micrographs, or other authentic reproduction of such records.

B. Inspections and Audits.

Any authorized representative of the District shall have access to any books, documents, papers, and records, including, but not limited to, financial records of Contractor, which the District determines to be pertinent to this Agreement, for the purposes of making audit, evaluation, examination, excerpts, and transcripts during the period such records are to be maintained by Contractor. Further, the District has the right, at all reasonable times, to audit, inspect, or otherwise evaluate the work performed or being performed under this Agreement.

17. Non-Discrimination

During the performance of this Agreement, Contractor, its agents, officers, employees, and subcontractors shall not unlawfully discriminate in violation of any federal, state, or local law, against any employee, or applicant for employment, or person receiving services under this Agreement, because of race, religion, color, ancestry, national origin, physical handicap, medical condition, marital status, age, or sex. Contractor and its agents, officers, employees, and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code section 12900, et seq.), and the applicable regulations promulgated thereunder in the California Code of Regulations. Contractor shall also abide by the Federal Civil Rights Act of 1964 (P.L. 88-352) and all amendments thereto, and all administrative rules and regulations issued pursuant to said act.

18. District Termination and Cancellation Rights

This Agreement may be canceled by the District without cause, and at will, for any reason by giving to Contractor 30 days' written notice ("Termination Notice") of such intent to cancel. Upon receipt of Termination Notice, Contractor shall stop all performance under this Agreement except as directed by the District. In the event of any such cancellation, Contractor shall be entitled to compensation for all work performed prior to receipt of the Termination Notice as well as work performed after receipt of the Termination Notice and prior to expiration of the thirty (30) day notice period to the extent such post-notice work was performed at the direction of the District, assuming all of said work falls within the Scope of the Work commissioned by the District.

19. Assignment

This is an agreement for the services of Contractor. The District has relied upon the skills, knowledge, experience, and training of Contractor as an inducement to enter into this Agreement. Contractor shall not assign or subcontract this Agreement, or any part of it, without the express written consent of the District. Further, Contractor shall not assign any monies due or to become due under this Agreement without the prior written consent of the District.

20. Default

If Contractor abandons the Work, or fails to proceed with the Work requested by the District in a timely manner, or fails in any way as required to conduct the Work as required by this Agreement, the District may declare Contractor in default and terminate this Agreement upon five (5) days' written notice to Contractor. Contractor shall be liable to the District for all additional costs and expenses incurred by the District in finishing the Work as well as any damages incurred as a result of Contractor's default, which at the option of the District may be charged against any amounts due from the District to Contractor hereunder. Upon such termination by default, District will pay to Contractor all amounts owing to Contractor for services and work satisfactorily performed through the date of termination assuming said work falls within the Scope of the Work commissioned by the District, less any offsets the District is entitled under this Agreement. This Section 20 is not intended to constitute and shall not constitute a limitation on any damages the District may seek in the event of Contractor's default.

21. Waiver of Default

Waiver of any default by either party to this Agreement shall not be deemed to be a waiver of any subsequent default. Waiver or breach of any provision of this Agreement shall not be deemed to be a waiver of any other or subsequent breach, and shall not be construed to be a modification of the terms of this Agreement unless this Agreement is modified as provided in paragraph 28 below.

22. Confidentiality

Contractor agrees to comply with various provisions of the federal, state, and county laws, regulations, and ordinances providing that information and records kept, maintained, or accessible by Contractor in the course of providing the Work under this Agreement, shall be privileged,

restricted, or confidential. Contractor agrees to keep confidential all such privileged, restricted or confidential information and records. Disclosure of such information or records shall be made by Contractor only with the express written consent of the District.

23. Conflicts

Contractor agrees that it has no interest, and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of the Work under this Agreement. Contractor agrees to complete and file a conflict of interest statement.

24. Post-Agreement Confidences

Contractor agrees not to use any confidential, protected, or privileged information which is gained from the District in the course of providing the Work under this Agreement, for any personal benefit, gain, or enhancement.

25. Severability

If any portion of this Agreement or application thereof to any person or circumstance shall be declared invalid by a court of competent jurisdiction, or if it is found in contravention of any federal, state, or local statute, ordinance, or regulation, the remaining provisions of this Agreement, or the application thereof, shall not be invalidated thereby, and shall remain in full force and effect to the extent that the provisions of this Agreement are severable.

26. Funding Limitations

The ability of the District to enter into this Agreement is based upon available funding from various sources. In the event that such funding fails, is reduced, or is modified, from one or more sources, the District has the option to terminate, reduce, or modify this Agreement, or any of its terms, within ten (10) days of its notifying Contractor of the termination, reduction, or modification of available funding, except, however, the District can not reduce Contractor's right(s) to recover payments due for work performed prior to the notification. Any reduction or modification of this Agreement made pursuant to this provision must comply with the requirements (except the requirement of mutual consent) of paragraph 28 below.

27. Venue

This Agreement shall be governed under the laws of the State of California and venue for any litigation under this Agreement shall be the county of Humboldt, State of California.

28. Amendment

This Agreement may be extended, modified, amended, changed, added to, or subtracted from, by the mutual consent of the parties hereto, if such amendment or change is in written form, signed by authorized representatives of the parties, in full compliance with the Public Contract Code, and attached to the original Agreement to maintain continuity.

29. Notice

Any notice, communication, amendments, additions, deletions to this Agreement, including change of address of either party during the term of this Agreement, shall be in writing and may be personally serviced, or sent by prepaid first class mail to the respective parties as follows:

McKinleyville Community Services District:

Attention: Gregory Orsini, General Manager
1656 Sutter Rd.
McKinleyville, CA 95519
Phone: (707) 839-3251
Fax: (707) 839-8456

Contractor:

30. Entire Agreement

This Agreement, along with **Attachments A, A1, A2 and B**, contain the entire agreement of the parties, and no representations, inducements, promises, or agreements otherwise between the parties not embodied

herein or incorporated herein by reference, shall be of any force or effect. Further, no term of provision hereof may be changed, waived, discharged, or terminated, unless the same be in writing executed by the parties hereto.

Signatures

MCKINLEYVILLE COMMUNITY SERVICES DISTRICT

By: _____

Name: Gregory Orsini

Title: General Manager

Date: _____

CONTRACTOR

By: _____

Name: _____

Title: _____

Date: _____

EXHIBIT E

PROJECT MANUAL

FOR

McKinleyville Community Services District

McKINLEYVILLE TEEN CENTER

CIP #117



McKINLEYVILLE, CALIFORNIA

1 OCTOBER 2014

PROJECT MANUAL
FOR
McKINLEYVILLE TEEN CENTER

McKINLEYVILLE COMMUNITY SERVICES DISTRICT
McKINLEYVILLE, CALIFORNIA

GENERAL CONDITIONS

Refer to Standard Contract for McKinleyville Community Services District

SPECIFICATIONS

DIVISION 1: GENERAL REQUIREMENTS

Section 01 00 10	Definitions
Section 01 11 00	Summary of the Work
Section 01 14 00	Working Conditions
Section 01 20 00	Price & Payment Procedures
Section 01 26 00	Contract Modification Procedures
Section 01 31 19	Project Meetings & Schedules
Section 01 32 00	Construction Progress Documentation
Section 01 33 00	Submittal Procedures
Section 01 35 00	Special Conditions
Section 01 40 00	Procedures & Quality Control
Section 01 45 00	Product Handling
Section 01 50 00	Temporary Facilities and Controls
Section 01 57 23	Storm Water Prevention Plan
Section 01 60 00	Materials & Equipment
Section 01 70 00	Project Closeout
Section 01 73 29	Cutting and Patching
Section 01 74 19	Construction Waste Management & Disposal
Section 01 78 39	Project Record Documents
Section 01 93 00	Maintenance

DIVISION 2: EXISTING CONDITIONS

Section 02 41 16	Demolition & Disposal
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DIVISION 3: CONCRETE

Section 03 30 00	Cast-In-Place Concrete
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DIVISION 4: MASONRY

Section 04 22 00	Concrete Unit Masonry
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DIVISION 5: METALS

Section 05 12 00	Structural Steel Framing
Section 05 40 00	Cold Formed Metal Framing
Section 05 50 00	Metal Fabrications

DIVISION 6: WOOD, PLASTICS AND COMPOSITES

Section 06 10 00	Rough Carpentry
Section 06 17 53	Shop-Fabricated Wood Trusses
Section 06 18 00	Structural Glued Laminated Timber
Section 06 40 23	Interior Architectural Woodwork

DIVISION 7: THERMAL & MOISTURE PROTECTION

Section 07 21 00	Building Insulation
Section 07 41 13	Metal Roof Panels
Section 07 42 13	Metal Wall & Soffit Panels
Section 07 46 46	Fiber Cement Board Siding
Section 07 54 00	Thermoplastic Membrane Roofing
Section 07 62 00	Sheet Metal Flashing and Trim
Section 07 92 00	Joint Sealants

DIVISION 8: OPENINGS

Section 08 11 13	Hollow Metal Doors and Frames
Section 08 14 16	Flush Wood Doors
Section 08 33 23	Overhead Coiling Doors
Section 08 36 10	Sectional Overhead Doors
Section 08 41 10	Aluminum-Framed Entrances and Storefronts
Section 08 71 00	Finish Hardware
Section 08 80 00	Glazing

DIVISION 9: FINISHES

Section 09 29 00	Gypsum Board Assemblies
Section 09 30 00	Ceramic Tile
Section 09 51 23	Acoustical Panel Ceilings
Section 09 65 19	Resilient Floor Tile
Section 09 65 43	Resilient Linoleum Sheet Flooring
Section 09 68 00	Carpet
Section 09 91 00	Painting

DIVISION 10: SPECIALTIES

Section 10 14 00	Signage
Section 10 21 13	Toilet Compartments
Section 10 22 00	Operable Partitions
Section 10 28 00	Toilet and Bath Accessories
Section 10 71 13	Exterior Sun Control Devices

DIVISION 12: FURNISHINGS

Section 12 24 13	Roll Down Window Shades
Section 12 48 13	Entrance Floor Mats & Frames

DIVISION 21: FIRE SUPPRESSION

Section 21 00 00	Fire Protection
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DIVISION 22: PLUMBING

Section 22 00 00	Plumbing, Common Work
Section 22 05 23	General Duty Valves for Plumbing Piping
Section 22 07 19	Pipe Insulation
Section 22 11 00	Water & Gas Piping

Section 22 13 00

Waste Vent Plumbing

DIVISION 23: HEATING, VENTILATING & AIR CONDITIONING (HVAC)

Section 23 05 00	Common Work Results for HVAC
Section 23 05 48	Vibration & Seismic Controls for HVAC
Section 23 05 93	Testing, Adjusting & Balancing for HVAC
Section 23 07 00	HVAC Insulation
Section 23 11 23	Facility Natural Gas Piping
Section 23 31 00	HVAC Ducts and Casing
Section 23 33 00	Air Duct Accessories
Section 23 34 00	Fans
Section 23 37 00	Air Outlets & Inlets
Section 23 73 35	Gas Fired Heating & Ventilating Units
Section 23 81 03	Packaged Rooftop Air Conditioning Units

DIVISION 26: ELECTRICAL

Section 26 05 00	Common Work Results for Electrical
Section 26 05 19	Low Voltage Elect. Power Conductors and Cables
Section 26 05 26	Grounding & Bonding for Electrical Systems
Section 26 05 33	Raceways and Boxes for Electrical Systems
Section 26 08 00	Commissioning of electrical Systems
Section 26 24 00	Switchboards and Panelboards
Section 26 27 00	Low Voltage Distribution Equipment
Section 26 27 26	Wiring Devices
Section 26 50 00	Lighting

DIVISION 27: COMMUNICATIONS

Section 27 00 00	Communications Cabling
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DIVISION 28: ELECTRONIC SAFETY & SECURITY

Section 28 00 00	Fire Alarm System
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DIVISION 31: EARTHWORK

Section 31 00 00	Earthwork
Section 31 11 00	Clearing & Grubbing
Section 31 23 17	Trenching, Backfilling & Compacting
Section 31 50 00	Excavation Support & Protection

DIVISION 32: EXTERIOR IMPROVEMENTS

Section 32 12 16	Asphalt Paving
Section 32 17 23	Pavement Markings

DIVISION 32: UTILITIES

Section 33 11 13	Public Water Utility Distribution Piping
Section 33 12 13	Water Service Connections
Section 33 12 16	Water Utility Distribution Valves and Appurtenances
Section 33 13 00	Disinfection of Water Utility Distribution Piping

Section 33 31 13

Public Sanitary Utility Sewerage Piping -
Gravity

Section 33 41 13

Public Storm Utility Drainage Piping

Section 33 41 14

Storm Drainage Structures

APPENDIX A

Construction Waste Management Forms

APPENDIX B

Geotechnical Report by SHN dated 24 JULY 2014

END OF INDEX

SECTION 01 00 10 - DEFINITIONS

PART 1 - GENERAL

1.01 Architect

A Architect shall mean LDA Partners, LLP

1.02 CONSTRUCTION MANAGER / PROJECT MANAGER

A. Construction Manager or Project Manager shall mean the designated Construction or Project Manager by the McKinleyville Community Services District.

1.03 DISTRICT / CITY / OWNER

A. District, City or Owner shall mean the McKinleyville Community Services District, California.

END OF SECTION

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

- 1.01 The work herein to be performed by the Contractor consists of constructing and completing the "Project," as defined in the General Conditions and Requirements, in accordance with the Drawings and Specifications and all applicable provisions of the Contract Documents and the McKinleyville Community Services District and Humboldt County Standards. It is intended that these plans and the District and County Standard Specifications and these Special Provisions require all labor and materials necessary for the work contemplated. The Contractor shall notify the District immediately regarding any discrepancies or ambiguities which may exist in the Plans, Specifications and Special Provisions. The District's interpretation or correction thereof shall be conclusive.
- 1.02 The "Project" shall generally consist of construction of a new teen center and site improvements as described in the Plans and Specifications entitled MCKINLEYVILLE TEEN CENTER, McKinleyville, CA. Project Number 117..
- A. Informational Signs: At least two days in advance of any construction activity, the Contractor shall install a project information construction sign(s) 48" by 96" in size (minimum) with 4" minimum height letters, at the site where construction work is occurring. Letters shall be black on white background. Location of the sign shall be determined by the Construction Manager. Compensation for this item shall be included in the base bid. Information on the sign shall include the name of the Owner, the Architect and his Consultants, Contractor, funding source, and a twenty-four hour telephone number. An elevation graphic to be inserted into the signage will be supplied by the Architect.
 - B. The "Work" as described in these specifications shall generally consist of all work specified, indicated, shown or contemplated in the contract to construct the improvements.
 - C. Order and furnish all labor, materials, supplies, tools, and transportation and perform all operations in connection with and reasonably incidental to complete the installation of the project.
 - D. Official bid documents including plans and specifications must be purchased in order to obtain the plan holder's number required to bid this project. All bids submitted for this project must conform to the requirements of the official bid documents, including plans and specifications.

PART 2 – PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 00 - WORKING CONDITIONS

PART 1 - GENERAL

1.01 Description

- A. Attention is directed to AIA document 201 and the Example Professional Services Agreement included within the Bid Documents and these Special Provisions.
- B. The Contractor shall not shut down any part of the existing services without prior authorization from the District or its Agents. After the completion of specific work, all electric, water, gas, or telephone services temporarily disconnected shall be immediately restored.
- C. The Construction Manager shall assign to the Contractor at the pre-construction meeting allowable areas for the storage of construction materials and for the use by workmen and the limits of the work assigned to him.
- D. The Contractor shall be responsible for obtaining City, County, State or Federal permits, licenses, certificates, approvals prior to and for the completion of the work. All applicable provisions of OSHA regarding Occupational Safety and Health Administration Code shall be adhered to.
- E. All work under this contract will be under the control and inspection of the County, or his appointed representatives. Any and all construction comments by other forces shall be referred to the Architect.
- F. The contractor shall protect any existing turf/landscaping and site appurtenances to remain. The contractor shall be responsible for the repair of all damages to the satisfaction of the District representative.

END OF SECTION

SECTION 01 20 00 - PRICE & PAYMENT PROCEDURES

PART 1 - GENERAL

- 1.01 Schedule of Values: A schedule of values to show breakdown of Contract corresponding with payment request breakdown and progress schedule line items is required for this project. The Items of Work Schedule shall be the basis of the schedule of values. The Contractor shall expand and/or modify this schedule as directed by the Construction Manager. The line item breakdown of the schedule of values shall be subject to approval by the District representative. Schedule of values shall be submitted within ten (10) days of the Notice to Proceed. The Items of Work Schedule is shown in Appendix A.
- 1.02 Payment Requests: Submit request for payment as outlined in the contract or as below:
- A. Prior to initial payment request, submit:
 - 1. Schedule of values
 - 2. Progress schedule
 - 3. Payroll records
 - 4. DAS-140 forms
 - B. Contractor may submit final payment request, provided the following have been completed:
 - 1. Submit warranties and similar documentation
 - 2. Signed Mechanics' Lien release, or other proof of final payment, from each subcontractor
 - 3. Submit maintenance manuals and provide instruction of District's operational/maintenance personnel.
 - 4. Complete final punch list and cleaning of the work.
 - 5. Attend post construction meeting.
 - 6. Issuance of a Certificate of Occupancy
 - C. The contract lump sum price paid for each bid item shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in each of the items, as shown on the plans, as specified in the District & County Standard Specifications and these special provisions, and the Project Manual, and as directed by the Construction Manager and Architect. Items not specifically listed but necessary for a full and complete installation of the work (e.g. mobilization, construction staking, erosion and sediment control, etc.) shall be considered incidental to the items listed and no separate payment for such items shall be made. The Construction Manager's determination of what items are to be included in the category of "necessary for a full and complete installation of the work" shall be final.

END OF SECTION

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.03 CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions." Contractor overhead & profit percentages shall be limited to 10% for all Change Orders. This shall include deductive amounts and shall also apply to subcontractors.

1.04 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a) Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c) Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.05 ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place.
 1. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 2. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 3. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

1.06 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, the Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.07 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Construction Manager may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2. - PRODUCTS (Not Used)

PART 3. - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 19 - PROJECT MEETINGS AND SCHEDULES

PART 1 - GENERAL

- 1.01 Pre-construction Meeting: The Contractor shall contact the Construction Manager, 72 hours prior to starting the project to arrange for a pre-construction meeting.
- 1.02 Periodic Meetings: Periodic job site meetings may be requested by the Construction Manager and Architect to review modifications or conflicts in the Work. The Contractor shall attend such meetings and shall require subcontractors to attend as necessary and/or as requested.
- 1.03 Project Schedule:
 - A. Immediately upon awarding of the contract, and at the time of the pre-construction meeting, the Contractor shall prepare and submit to the Construction Manager six (6) copies of the revised construction schedule. The schedule shall be in a form acceptable to the Construction Manager showing the proposed date of commencement and completion of each of the various subdivisions or units of work required under this Contract. Items on the schedule shall be arranged in the order and sequence in which they will be performed. The schedule shall conform to the working time and time of completion established under the terms of the Contract and shall be subject to modification by and approval by the Construction Manager. When, in the opinion of the Construction Manager it becomes necessary to accelerate the work, the Contractor, when so ordered, shall modify the schedule to conform to such requirements.
- 1.04 Estimate of Cost
 - A. The Contractor shall also furnish periodic itemized estimates of work done for the purpose of making payments thereon. The estimates shall list the items and percentage of completion of each line item in the approved schedule of values.
- 1.05 Post Construction Meeting
 - A. The Contractor may be required to attend a post construction meeting that will be arranged by the District representative after completion of work and prior to acceptance and final payment. The project Architect and the project inspector shall attend this meeting. The purpose of the meeting will be to discuss the project and any related issues that can help improve future construction projects.

END OF SECTION

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Field condition reports.
 - 5. Special reports.
- B. Related Sections include the following:
 - 1. Division 1 Section 01330 "Submittal Procedures" for submitting schedules and reports.

1.03 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article and in-house scheduling personnel to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Preliminary Construction Schedule: Submit five printed copies.
- C. Contractor's Construction Schedule: Submit five printed copies of initial schedule, large enough to show entire schedule for entire construction period.
- D. CPM Reports: Concurrent with CPM schedule, submit five printed copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of all activities sorted in ascending order of total float.
- E. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

- F. Special Reports: Submit two copies at time of unusual event.

1.04 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2. - PRODUCTS

2.01 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section 01330 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Startup and Testing Time: Include not less than 14 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time.
- B. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a) Preparation and processing of submittals.
 - b) Delivery.
 - c) Fabrication.
 - d) Installation.
 - 2. Processing: Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 - 3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a) Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- C. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.

2.03 REPORTS

- A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a

request for information on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.04 SPECIAL REPORTS

- A. General: Submit special reports directly to Construction Manager within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3. - EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule two days before each regularly scheduled progress meeting.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

END OF SECTION 01320

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.03 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's and Construction Manager's responsive action.
- B. Informational Submittals: Written information that does not require Architect's and Construction Manager's approval. Submittals may be rejected for not complying with requirements.

1.04 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a) Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager's receipt of submittal.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Allow 15 days for processing each resubmittal.

4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Include the following information on label for processing and recording action taken:
 - a) Project name.
 - b) Date.
 - c) Name and address of Contractor.
 - d) Name and address of subcontractor.
 - e) Name and address of supplier.
 - f) Name of manufacturer.
 - g) Unique identifier, including revision number.
 - h) Number and title of appropriate Specification Section.
 - i) Drawing number and detail references, as appropriate.
 - j) Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
 2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect and Construction Manager will return submittals, without review, received from sources other than Contractor.
 1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect and Construction Manager in connection with construction.

PART 2. - PRODUCTS

2.01 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies: Submit six copies of each submittal, unless otherwise indicated. Architect, through Construction Manager, will return four copies. Mark up and retain one returned copy as a Project Record Document.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Include the following information, as applicable:
 - a) Manufacturer's written recommendations.
 - b) Manufacturer's product specifications.
 - c) Manufacturer's installation instructions.
 - d) Color charts.
 - e) Manufacturer's catalog cuts.
 - f) Wiring diagrams showing factory-installed wiring.
 - g) Printed performance curves.
 - h) Operational range diagrams.
 - i) Mill reports.
 - j) Standard product operating and maintenance manuals.
 - k) Compliance with recognized trade association standards.
 - l) Compliance with recognized testing agency standards.
 - m) Application of testing agency labels and seals.
 - n) Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Include the following information, as applicable:
 - a) Dimensions.
 - b) Identification of products.
 - c) Fabrication and installation drawings.
 - d) Roughing-in and setting diagrams.
 - e) Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f) Shopwork manufacturing instructions.
 - g) Templates and patterns.
 - h) Schedules.
 - i) Design calculations.
 - j) Compliance with specified standards.
 - k) Notation of coordination requirements.
 - l) Notation of dimensions established by field measurement.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 3. Number of Copies: Submit six blue- or black-line prints of each submittal, unless prints are required for operation and maintenance manuals. Submit six prints where prints are required for operation and maintenance manuals. Architect and Construction Manager will retain three prints; remainder will be returned. Mark up and retain one returned print as a Project Record Drawing.
- D. Samples: Prepare physical units of materials or products, including the following:
1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 2. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity.

Sample sets may be used to determine final acceptance of construction associated with each set.

- a) Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

2.02 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit six copies of each submittal, unless otherwise indicated. Architect and Construction Manager will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- C. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- D. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- E. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures Operation and Maintenance Data."
- F. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

PART 3. - EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

- A. General: Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.
 - 1. Action Submittals: Architect and Construction Manager will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- B. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION

SECTION 01 35 00 - SPECIAL CONDITIONS

PART 1 – GENERAL

1.01 Description

- A. This work shall be done in accordance with the McKinleyville Community Services District & Humboldt County, Standard Specifications and Plans insofar as the same may apply and in accordance with the following Special Provisions. To the extent the Department of Transportation Standard Specifications implement the STATE CONTRACT ACT they shall not be applicable since the McKinleyville Community Services District is not subject to said ACT.
- B. In case of conflict between the Standard specifications and these Special Provisions, the Special Provisions shall take precedence over and be used in lieu of such conflicting portions.
- C. In the event of conflict between latest County adopted editions of the governing codes (Uniform Building Code, National Electric Code, Uniform Fire Code, Uniform Plumbing Code and Uniform Mechanical Code) and others as applicable, and the Standard Specifications and the Special Provisions, the governing code requirements shall take precedence.
- D. Existing Facilities: The Contractor shall protect all existing facilities from damage. It shall be the responsibilities of the Contractor to ascertain their exact location and to protect them from damage. Any existing utilities damaged due to the Contractor's operation shall be repaired to the satisfaction of the Construction Manager at no additional cost to the District.
- E. The Contractor shall notify the Construction Manager forty-eight (48) hours in advance of any construction.

END OF SECTION

SECTION 01 40 00 - PROCEDURES AND QUALITY CONTROL

PART 1 - GENERAL

1.01 Progress Schedule

- A. Progress schedule shall be required for this project and shall conform to the provisions of these Special Provisions.

1.02 Installation

- A. General: Comply with manufacturer's instructions and recommendations. Clean and protect to ensure that products, materials and equipment will be free from damage and deterioration at time of acceptance.
- B. Installer Cooperation: Require installer of each major unit of work to inspect substrate and conditions for installation, and to report (in writing) unsatisfactory conditions. Correct unsatisfactory conditions before proceeding. Inspect each product immediately before installation, and do not install damaged or defective products, materials or equipment.

1.03 Cleaning and Protection:

- A. General: Clean each element of work at time of installation. Provide sufficient maintenance and protection during construction to ensure freedom from damage and deterioration at time of substantial completion.

END OF SECTION

SECTION 01 45 00 - PRODUCT HANDLING

PART 1 - GENERAL

- 1.01 Work included: Protect products scheduled for use in the work by means including, but not necessarily limited to, those described in this Section. Quality Assurance: Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.
- 1.02 Manufacturer's Recommendations: Except as otherwise approved by the Construction Manager or Architect, determine and comply with manufacturers' recommendation on product handling, storage, and protection.
- 1.03 Packaging
 - A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the District.
 - B. The Architect may reject as non-complying such material and products that do not bear identification satisfactory to the Construction Manager as to manufacturer, grade, quality, and other pertinent information.
- 1.04 Repairs and Replacements
 - A. In event of damage, promptly make replacements and repairs to the approval of the Construction Manager and at no additional cost to the District.
 - B. Additional time required to secure replacements and to make repairs will not be considered by the Construction Manager to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution.
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 3. Electric power service.
 - 4. Lighting.
 - 5. Telephone /internet service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Temporary roads and paving.
 - 2. Dewatering facilities and drains.
 - 3. Project identification and temporary signs.
 - 4. Waste disposal facilities.
 - 5. Field offices.
 - 6. Storage and fabrication sheds.
 - 7. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Site enclosure fence.
 - 5. Security enclosure and lockup.
 - 6. Barricades, warning signs, and lights.
 - 7. Fire protection.

1.03 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner's construction forces.
 - 2. Occupants of Project.
 - 3. Architect.
 - 4. Testing agencies.
 - 5. Personnel of authorities having jurisdiction.

1.04 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.
1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
1. Keep temporary services and facilities clean and neat.
 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2. - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm) 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- C. Water: Potable.

2.02 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices: Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading. Contractor may use unoccupied area of the existing building for his field office, upon approval of the Construction Manager.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

- D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
 - 1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7.2 to 12.7 deg C).
- F. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light. There is existing power to the facility. The Contractor may use existing power connections for construction of the facility. Contractor is required to provide power as required during all electrical service transfers and shutdowns.

PART 3. - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations. There is existing power to the facility. The Contractor may use existing power connections for construction of the facility. Contractor is required to provide power as required during all electrical service transfers and shutdowns.
 - 1. Arrange with utility company, and Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. There is existing water service to the building. The Contractor may use the existing water connection for construction purposes. Water meter must be replaced. The Contractor is to supply water as required during shutdown of existing service during change-over.
 - 1. Provide rubber hoses as necessary to serve Project site.
 - 2. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 - 2. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
- D. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
 - 1. Connect temporary service to Owner's existing power source, as directed by electric company officials.
- E. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
 - 1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 - 2. Provide warning signs at power outlets other than 110 to 120 V.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.
 - 1. Provide additional telephone lines for the following:
 - a) Provide a dedicated telephone line for a facsimile machine.
 - 2. At each telephone, post a list of important telephone numbers.
 - a) Police and fire departments.
 - b) Ambulance service.
 - c) Contractor's home office.
 - d) Architect's office.
 - e) Owner's office.
 - f) Principal subcontractors' field and home offices.
 - 3. Provide voice-mail service on superintendent's telephone.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.
- B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.
- D. Site Enclosure Fence: When excavation begins, install portable chain-link enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
 1. Set fence posts in concrete bases.
 2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
 3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with two sets of keys. Provide list of personnel with keys.
- E. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- F. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
 1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- (16-mm-) thick exterior plywood.
- G. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
 - a) Field Offices: Class A stored-pressure water-type extinguishers.

- b) Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
 - c) Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
- 2. Store combustible materials in containers in fire-safe locations.
- 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
- 4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- 5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- 6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
 - 1. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION

SECTION 01 57 23 - STORM WATER POLLUTION PREVENTION PLAN IMPLEMENTATION

PART 1 - GENERAL

1.01 Scope

- A. The contractor shall be responsible for preparing and submitting a Storm Water Pollution Prevention Plan (SWPPP). Contractor shall submit the SWPPP to the District representative within fifteen (15) working days of award of the contract by the District. The submittal shall contain the following:
 - 1. Vicinity Map (can be copied from the bid specification package);
SWPPP (prepared by contractor).
- B. Prior to, or concurrently, the District will file the Notice of Intent (NOI) with the State Water Resources Control Board, and will present a copy of the NOI to the contractor when accepted by the State. The contractor shall keep a complete copy of the SWPPP and the NOI on the construction site at all times.
- C. The Contractor shall perform all operations and provide all equipment and materials necessary for complete and continuous implementation of the SWPPP as shown on the drawings and per the submitted forms.

1.02 Standards

All work shall conform to the requirements set forth in the State Water Resources Control Board. (SWRCB), Order No 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRS) for Discharges of Storm Water Runoff, associated with construction activity. In particular, the contractor's attention is directed to Section B: Monitoring program and reporting requirements and Section C: Standard Provisions for Construction activity.

1.04 Notice of Termination

- A. Upon completion of the substantial completion review, the contractor shall prepare for the District's signature, a SWRCB Notice of Termination (NOT) of coverage under the NPDES General Permit No. CAS 000002 for Discharges of Storm Water Associated with Construction Activity.

Part 2 – Products

2.01 Materials

- A. All materials used for implementation of the SWPPP shall be new and they shall be of a manufacturer, type, and quality generally accepted for storm water pollution prevention by the construction industry.

Part 3 – Execution

Install, execute, and monitor all storm water pollution prevention activities per the SWPPP as shown on the drawings.

END OF SECTION

SECTION 01 6 00 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

- 1.01 The Contractor shall furnish all materials and/or equipment needed to complete the work and installations required under the terms of the Contract; exclusive of such materials and/or equipment specifically designated to be furnished and/or installed by the District or under separate Contract.
- A. The Contractor shall submit satisfactory evidence of compliance with the specifications of such materials and/or equipment to be furnished under the Contract and/or to be incorporated in to the work, as the Construction Manager may require.
- 1.02 Trade Names
- A. Whenever in these Specifications or on the Drawings the name or brand of manufactured article is used it is intended to indicate a measure of quality and utility or a standard.
- 1.03 Quality
- A. Both materials and workmanship shall be first quality; all of which shall be subject to the review of the Construction Manager. Materials shall be new and free from either factory, shop or field applied trade signs or advertising labels exposed to view in the finished work, except only as specified for certain identification work and/or only necessary to identify fire-rated materials or construction.
- 1.04 Substitutions
- A. Within ten (10) days after the "Notice to Proceed," the Contractor shall submit for record and information a complete list of all materials which differ in any respect from materials specified and all materials which are proposed for use in work of this Contract and which are not specifically mentioned in the Specifications.
- B. Specific Requirements: The Construction Manager will consider proposals for substitution of materials, equipment and/or methods only when such proposals are accompanied by full and complete technical data and other information required by the Construction Manager to evaluate the proposed substitution. Proposals submitted without complete data will not be considered. Do not substitute materials, equipment and/or methods unless such substitution has been specifically approved for the work by the Construction Manager or Architect. The Architect will be the sole authority of approval or disapproval of substitutions.
- C. Unavailability of Equipment or Materials: Substitution for specified equipment or materials may be proposed by the Contractor if the specified equipment or materials cannot be delivered and incorporated in the work in the time allowed due to conditions beyond the control of the Contractor. Each request for substitution shall include a statement of cause with substantiating documents as proof of quality, delivery time, and costs in the form of certified quotations from suppliers of both specified and proposed material. Request shall be proposed and submitted as required below.

END OF SECTION

SECTION 01 70 00 - PROJECT CLOSEOUT

1 PART 1 - GENERAL

1.01 Related Documents

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 Summary

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final cleaning.

- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.03 Substantial Completion

Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
2. Advise Owner of pending insurance change-over requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items.
7. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.

8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

Inspection Procedures: On receipt of a request for inspection, the Construction Manager will either proceed with inspection or advise the Contractor of unfilled requirements. The Construction Manager will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Construction Manager will repeat inspection when requested and assured that the Work has been substantially completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 Final Acceptance

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the Construction Manager's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Construction Manager and Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.

1. Upon completion of reinspection, the Construction Manager will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.05 Record Document Submittals

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Construction Manager's reference during normal working hours.

B. Record Drawings: Refer to Section 01781 "Project Record Documents".

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Construction Manager for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Construction Manager for the Owner's records.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Engineer and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Engineer for the Owner's records.

G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.

4. Wiring diagrams.
5. Recommended "turn around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

Part 2 - Products (Not Applicable)

Part 3 - Execution

3.01 Closeout Procedures

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.02 Final Cleaning

A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

B. Cleaning: Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are

noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 2. Divisions 2 through 50 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 3. Construction Drawings.

1.03 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.04 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio, U.O.N.
- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 1. Primary operational systems and equipment.
 - 2. Fire-protection systems.
 - 3. Control systems.
 - 4. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety, U.O.N.

1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Piping, ductwork, vessels, and equipment.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades, as applicable. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2. - PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications and the Drawings.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3. - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut. Shoring shall be "design build" by Contractor.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a) Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 -GENERAL

1. RELATED DOCUMENTS

- a) Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

2. SUMMARY

- a) Section includes administrative and procedural requirements for the following:
 - Salvaging nonhazardous demolition and construction waste.
 - Recycling nonhazardous demolition and construction waste.
 - Disposing of nonhazardous demolition and construction waste.
- b) Related Requirements:
 - Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
 - Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
 - Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

3. DEFINITIONS

- a) Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- b) Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- c) Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- d) Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- e) Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

4. PERFORMANCE REQUIREMENTS

- a) General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable

means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

Demolition Waste:

- Asphalt paving.
- Concrete.
- Concrete reinforcing steel.
- Brick.
- Concrete masonry units.
- Wood studs.
- Wood joists.
- Plywood and oriented strand board.
- Wood paneling.
- Wood trim.
- Structural and miscellaneous steel.
- Rough hardware.
- Roofing.
- Insulation.
- Doors and frames.
- Door hardware.
- Windows.
- Glazing.
- Metal studs.
- Gypsum board.
- Acoustical tile and panels.
- Carpet.
- Carpet pad.
- Demountable partitions.
- Equipment.
- Cabinets.
- Plumbing fixtures.
- Piping.
- Supports and hangers.
- Valves.
- Sprinklers.
- Mechanical equipment.
- Refrigerants.
- Electrical conduit.
- Copper wiring.
- Lighting fixtures.
- Lamps.
- Ballasts.
- Electrical devices.
- Switchgear and panelboards.
- Transformers.

Construction Waste:

- Masonry and CMU.
- Lumber.
- Wood sheet materials.
- Wood trim.
- Metals.
- Roofing.
- Insulation.

Carpet and pad.
Gypsum board.
Piping.
Electrical conduit.

Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

Paper.
Cardboard.
Boxes.
Plastic sheet and film.
Polystyrene packaging.
Wood crates.
Plastic pails.

5. ACTION SUBMITTALS

- a) Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

6. INFORMATIONAL SUBMITTALS

- a) Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste. Include the following information:

Material category.
Generation point of waste.
Total quantity of waste in tons (tonnes).
Quantity of waste salvaged, both estimated and actual in tons (tonnes).
Quantity of waste recycled, both estimated and actual in tons (tonnes).
Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

- b) Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- c) Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- d) Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- e) Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- f) Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- g) Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

7. QUALITY ASSURANCE

- a) Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- b) Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - Review and discuss waste management plan including responsibilities of waste management coordinator.
 - Review requirements for documenting quantities of each type of waste and its disposition.
 - Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - Review waste management requirements for each trade.

8. WASTE MANAGEMENT PLAN

- a) General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- b) Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.
- c) Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

- d) Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:

Total quantity of waste.

Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.

Total cost of disposal (with no waste management).

Revenue from salvaged materials.

Revenue from recycled materials.

Savings in hauling and tipping fees by donating materials.

Savings in hauling and tipping fees that are avoided.

Handling and transportation costs. Include cost of collection containers for each type of waste.

Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

1. PLAN IMPLEMENTATION

- a) General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

- b) Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

Distribute waste management plan to everyone concerned within 7 days of submittal return.

Distribute waste management plan to entities when they first begin work on-site.
Review plan procedures and locations established for salvage, recycling, and disposal.

- c) Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

2. SALVAGING DEMOLITION WASTE

- a) Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - Clean salvaged items.
 - Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - Store items in a secure area until installation.
 - Protect items from damage during transport and storage.
 - Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- b) Salvaged Items for Donation: Not permitted on Project site.
- c) Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- d) Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- e) Plumbing Fixtures: Separate by type and size.
- f) Lighting Fixtures: Separate lamps by type and protect from breakage.
- g) Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3. RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- a) General: Recycle paper and beverage containers used by on-site workers.
- b) Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- c) Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

Inspect containers and bins for contamination and remove contaminated materials if found.

Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

Stockpile materials away from construction area. Do not store within drip line of remaining trees.

Store components off the ground and protect from the weather.

Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

4. RECYCLING DEMOLITION WASTE

- a) Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- b) Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
- c) Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

Clean and stack undamaged, whole masonry units on wood pallets.

- d) Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- e) Metals: Separate metals by type.

Structural Steel: Stack members according to size, type of member, and length. Remove and dispose of bolts, nuts, washers, and other rough hardware.

- f) Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- g) Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- h) Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- i) Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- j) Carpet Tile: Remove debris, trash, and adhesive.

Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

- k) Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- l) Conduit: Reduce conduit to straight lengths and store by type and size.

5. RECYCLING CONSTRUCTION WASTE

- a) Packaging:

Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

Polystyrene Packaging: Separate and bag materials.

Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

b) Wood Materials:

Clean Cut-Offs of Lumber: Grind or chip into small pieces.

Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

c) Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

6. DISPOSAL OF WASTE

a) General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

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

b) Burning: Do not burn waste materials.

c) Disposal: Remove waste materials from Owner's property and legally dispose of them.

7. ATTACHMENTS (APPENDIX A)

a) Form CWM-1 for construction waste identification.

b) Form CWM-2 for demolition waste identification.

c) Form CWM-3 for construction waste reduction work plan.

d) Form CWM-4 for demolition waste reduction work plan.

e) Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

f) Form CWM-6 cost/revenue analysis of demolition waste reduction work plan.

g) Form CWM-7 for construction waste

h) Form CWM-8 for demolition waste.

END OF SECTION

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.

1.03 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up Record Prints. Submit one copy of Record CAD Drawings.

PART 2. - PRODUCTS

2.01 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a) Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b) Accurately record information in an understandable drawing technique.
 - c) Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a) Dimensional changes to Drawings.
 - b) Locations and depths of underground utilities.
 - c) Revisions to routing of piping and conduits.
 - d) Revisions to electrical circuitry.

- e) Actual equipment locations.
 - f) Duct size and routing.
 - g) Locations of concealed internal utilities.
 - h) Changes made following Architect's written orders.
 - 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. Prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:
- 1. Format: .DWG, Version, AutoCAD 2014, operating in Microsoft Windows operating system, or approved equal.
 - 2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
 - 3. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
 - a) Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
 - b) CAD Software Program: The Contract Drawings are available in AutoCAD Architectural Desktop, R2i electronic format, Microsoft Windows Operating System.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Include identification on cover sheets.
 - 2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
 - 3. Identification: As follows:
 - a) Project name.
 - b) Date.
 - c) Designation "PROJECT RECORD DRAWINGS."
 - d) Name of Architect.
 - e) Name of Contractor.

PART 3. - EXECUTION

3.01 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 01 93 00 - MAINTENANCE

PART 1 - GENERAL

- 1.01 The Contractor shall perform all operations necessary for, and properly incidental to, cleanup during construction, and final site cleanup prior to the acceptance of the project by the District.
- 1.02 Cleanup During Construction
- A. During construction phases of the work the Contractor shall keep dust and debris to a minimum. In no instance shall dust and debris be permitted beyond the limits of the construction. The Contractor shall use all necessary measures to reduce the impact on District personnel at other areas of the building and the Construction Manager may, at any time during construction, order a general cleanup of the project as part of the work under this Section.
 - B. Contractor shall dispose of waste, trash, and debris in a safe, acceptable manner, in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Burying of such waste material and debris on the site will not be permitted. Burning of trash and debris on the site will not be permitted.
 - C. Location of dump for trash and debris and length of haul is the Contractor's responsibility.
- 1.03 Final Site Cleaning: Prior to final inspection, thoroughly clean the entire area and put into a neat, acceptable condition. Remove from the entire site all construction waste and used materials, dunnage, and all debris of any description resulting from the work.

END OF SECTION

SECTION 02 41 16 - DEMOLITION AND DISPOSAL

PART 1. - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of a building or structure.
 - 2. Demolition and removal of selected site elements.
- B. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Documentation" for preconstruction photographs taken before selective demolition.
 - 2. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 3. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
 - 4. Division 2 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.
 - 5. Division 2-50 Sections for demolishing, cutting, patching, or relocating all other items.
 - 6. Division 1 – Construction Waste Management

1.03 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.05 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services.

3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of temporary partitions and means of egress.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.06 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. If the Contractor or any of the Contractor's agents or employees encounters or discovers materials that appear (by visual or olfactory inspection) to contain regulated or hazardous materials (as defined by the California Environmental Protection Agency) during the performance of the Work, the Contractor shall inform the Engineer immediately and suspend work in the affected area until the Engineer has inspected the location and materials in question. If it becomes necessary to undertake remediation, the Engineer will give written notice to suspend work in the affected area until the proper course of action has been determined. Operations in the affected area shall be resumed only upon written notice by the Engineer.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Predemolition Conference: Conduct conference at Project site. Review methods and procedures related to selective demolition including, but not limited to, the following:
1. Inspect and discuss condition of construction to be selectively demolished.
 2. Review structural load limitations of existing structure.
 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.07 PROJECT CONDITIONS

- A. Maintain access to existing walkways and other adjacent occupied or used facilities.
1. Do not close or obstruct walkways or other occupied or used facilities without written permission from authorities having jurisdiction.
- B. Owner assumes no responsibility for condition of areas to be selectively demolished.
1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 2. Before selective demolition, Owner will remove the following items:
 - a) All equipment, included conditioning apparatus, and telescoping bleachers.
- C. Storage or sale of removed items or materials on-site will not be permitted.
- D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2. - PRODUCTS

PART 1. 2.01 FILL MATERIALS

PART 2. A. Fill material used to fill and/or cap underground pipes and structures.

PART 3. 1. Cement slurry mix shall be in conformance with "Section 19-3.02D: Slurry Cement Backfill" of the Caltrans Standard Specifications and shall consist of a fluid, workable mixture of aggregate, cement, and water. Slurry cement backfill shall be 2-sack mix, containing 188 pounds of Portland cement per cubic yard of material.

PART 4. 2. Other fill material as approved by the Engineer.

PART 3. - EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - 1. Provide at least 48 hours' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Refer to relative sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 3. Protect existing site improvements, appurtenances, and landscaping to remain.

4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- C. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- D. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- E. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.

3.04 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.05 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.

2. 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. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. 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 fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
 10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Existing Facilities: Comply with District's requirements for using and protecting other building facilities during selective demolition operations.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Carpet and Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
- F. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.
- 3.06 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: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Slabs-on-grade.
- B Related Sections include the following:
 - 1. Division 2 Section "Decorative Concrete Pavement" for concrete pavement and walks.

1.03 DEFINITIONS

- A Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 SUBMITTALS

- A Product Data: For each type of product indicated.
- B Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D Samples: For vapor barrier.
- E Welding certificates.
- F Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Curing compounds.
 - 5. Adhesives.

6. Vapor barriers..
7. Repair materials.

1.05 QUALITY ASSURANCE

- A Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- C Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- D ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301, "Specification for Structural Concrete, "Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a) Contractor's superintendent.
 - b) Independent testing agency responsible for concrete design mixtures.
 - c) Ready-mix concrete manufacturer.
 - d) Concrete subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, and concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

- A Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 FORM-FACING MATERIALS

- A Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
- B Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- F Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.

2.03 STEEL REINFORCEMENT

- A Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.
- B Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60.
- D Plain-Steel Wire: ASTM A 82, as drawn.
- E Deformed-Steel Wire: ASTM A 496.

- F Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- G Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- H Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized steel wire into flat sheets.

2.04 REINFORCEMENT ACCESSORIES

- A Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars, cut bars true to length with ends square and free of burrs.
- B Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
- C Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.05 CONCRETE MATERIALS

- A Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray:
 - a) Fly Ash: ASTM C 618, Class F.
- B Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size:
 - a) Foundations: 1 inch
 - b) Slab-on-grade: 1 inch thick
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C Water: ASTM C 94/C 94M and potable.

2.06 ADMIXTURES

- A Air-Entraining Admixture: ASTM C 260.
- B Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
1. Available Manufacturers:
 - a) Bayer Corporation.
 - b) ChemMasters.
 - c) Conspec Marketing & Manufacturing Co., Inc.; a Dayton Superior Company.
 - d) Davis Colors.
 - e) Elementis Pigments, Inc.
 - f) Hoover Color Corporation.
 - g) Lambert Corporation.
 - h) Scofield, L. M. Company.
 - i) Solomon Colors.
 2. Color: As selected by Architect from manufacturer's full range.

2.07 VAPOR BARRIERS

- A Plastic Vapor Barrier: ASTM E 1745, Class A not less than 15 mils (0.38 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
1. Available Products:
 - a) Stego Industries, LLC; Stego Wrap Vapor Barrier, 15 mils, or approved equal

2.08 CURING MATERIALS

- A Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Available Products:
 - a) Axim Concrete Technologies; Cimfilm.
 - b) Burke by Edoco; BurkeFilm.
 - c) ChemMasters; Spray-Film.
 - d) Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - e) Dayton Superior Corporation; Sure Film.
 - f) Euclid Chemical Company (The); Eucobar.
 - g) Kaufman Products, Inc.; Vapor Aid.
 - h) Lambert Corporation; Lambco Skin.
 - i) L&M Construction Chemicals, Inc.; E-Con.
 - j) MBT Protection and Repair, Div. of ChemRex; Confilm.
 - k) Meadows, W. R., Inc.; Sealtight Evapre.

- l) Metalcrete Industries; Waterhold.
 - m) Nox-Crete Products Group, Kinsman Corporation; Monofilm.
 - n) Sika Corporation, Inc.; SikaFilm.
 - o) Symons Corporation, a Dayton Superior Company; Finishing Aid.
 - p) Unitex; Pro-Film.
 - q) US Mix Products Company; US Spec Monofilm ER.
 - r) Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- B Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D Water: Potable.
- E Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Available Products:
- a) Burke by Edoco; Cureseal 1315 WB.
 - b) ChemMasters; Polyseal WB.
 - c) Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.
 - d) Euclid Chemical Company (The); Super Diamond Clear VOX.
 - e) Kaufman Products, Inc.; Sure Cure 25 Emulsion.
 - f) Lambert Corporation; UV Safe Seal.
 - g) L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
 - h) Meadows, W. R., Inc.; Vocomp-30.
 - i) Metalcrete Industries; Metcure 30.
 - j) Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.
 - k) Tamms Industries, Inc.; LusterSeal WB 300.
 - l) Unitex; Hydro Seal 25.
 - m) US Mix Products Company; US Spec Radiance UV-25.
 - n) Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2.09 RELATED MATERIALS

- A Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- C Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

- D Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

- A Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 15 percent.
- C Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

- D Color Pigment – where indicated: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A Footings and Interior Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength 3000 psi (20.7 MPa) at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50..
 - 3. Minimum Cementitious Materials Content: 5.75 sacks per cubic yard.
 - 4. Slump Limit: 4 inches (100 mm) plus or minus 1 inch (25 mm).

2.13 FABRICATING REINFORCEMENT

- A Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

- A Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

- A Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- D Construct forms tight enough to prevent loss of concrete mortar.
- E Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.

- F Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H Chamfer exterior corners and edges of permanently exposed concrete.
- I Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.03 REMOVING AND REUSING FORMS

- A General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- C When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 SHORES AND RESHORES

- A Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.05 VAPOR BARRIERS

- A Plastic Vapor Barrier: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

3.06 STEEL REINFORCEMENT

- A General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.07 JOINTS

- A General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.08 CONCRETE PLACEMENT

- A Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- F Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.09 FINISHING FORMED SURFACES

- A Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.
- C Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D Related Unformed Surfaces: 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. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- 3.10 FINISHING FLOORS AND SLABS
- A General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.
- C Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish.
- D Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
- E Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G Slip-Resistive Finish: Before final floating, apply slip-resistive aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aluminum granules over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
 2. After broadcasting and tamping, apply float finish.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

- E Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 CONCRETE SURFACE REPAIRS

- A Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F Repair materials and installation not specified above may be used, subject to Architect's approval.
- 3.14 FIELD QUALITY CONTROL
- A Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B Inspections:
1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Concrete Temperature: ASTM C 1064/C 1064/M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 4. Compression Test Specimens: ASTM C 31/C 31M.
 5. Compressive-Strength Tests: ASTM C 39/C 39M; test one set laboratory-cured specimen at 7 days and one set of two specimens at 28 days. Hold one cylinder in reserve.
 6. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 7. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 11. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- D Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION

SECTION 04 22 00 – CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
1. Concrete unit masonry.
 2. Reinforced unit masonry.
 3. Masonry waste disposal.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 3 Section "Concrete".
 2. Division 7 Section "Flashing and Sheet Metal" for exposed sheet-metal flashing installed in masonry.
 3. Division 7 Section "Joint Sealants".
 4. Division 8 Section "Hollow Metal doors and Frames".
- C. Products furnished but not installed under this Section include the following:
1. Anchor sections of adjustable masonry anchors for connecting to structural frame installed under Division 5 Section "Structural Steel."
- D. Products installed but not furnished under this Section include the following:
1. Steel shelf angles for unit masonry specified in Division 5 Section "Metal Fabrications."
 2. Manufactured reglets in masonry joints for metal flashing specified in Division 7 Section "Flashing and Sheet Metal."
 3. Hollow metal frames in unit masonry openings specified in Division 8 Section "Standard Steel Doors and Frames."

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (f_m) at 28 days.
1. For Concrete Unit Masonry: As follows, based on net area:
 - a. $f_m = 1500$ psi.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each different masonry unit, accessory, and other manufactured product specified.
- C. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.
- D. Samples for initial selection of the following:
 - 1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
 - 2. Colored-masonry mortar samples showing the full range of colors available.
- E. Samples for verification of the following:
 - 1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 - 2. Colored-masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on the Project. Label samples to indicate type and amount of colorant used.
 - 3. Accessories embedded in the masonry.
- F. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to specifically identify exact materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor acceptance of mockup constitutes approval of deviations from Contract Documents unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- G. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.
 - 1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 - 2. Each material and grade indicated for reinforcing bars.
 - 3. Each type and size of joint reinforcement.
 - 4. Each type and size of anchors, ties, and metal accessories.
- H. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
 - 1. Mortar complying with property requirements of ASTM C 270.
 - 2. Grout mixes. Include description of type and proportions of grout ingredients.
 - 3. Masonry units.

- I. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Contractor shall employ and pay a qualified professional engineer to provide a survey and inspection of foundations for compliance with dimensional tolerances.
- B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Preconstruction Testing: Employ and pay a qualified independent testing agency to perform the following preconstruction testing to establish compliance of proposed materials and construction with specified requirements:
 1. Concrete Masonry Unit Test: For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content per ASTM C 140.
 2. Prism Test: For each type of wall construction indicated, test masonry prisms per ASTM E 447, Method B.
 3. Test mortar properties per test methods of ASTM C 270.
 4. Evaluate mortar composition and properties per ASTM C 780.
 5. Test grout compressive strength per ASTM C 1019.
- D. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.
- E. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. Mockup: Prior to installing unit masonry, construct sample wall panels to verify selections made under sample submittals and to demonstrate aesthetic effects of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
 1. Locate mockups on site in the locations indicated or, if not indicated, as directed by Architect.
 2. Build mockup of typical wall area as shown on Drawings.
 3. Clean exposed faces of mockups with masonry cleaner indicated.
 4. Notify Architect one week in advance of the dates and times when mockups will be constructed.
 5. Protect accepted mockups from the elements with weather-resistant membrane.
 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

- a. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - b. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
 - c. When directed, demolish and remove mockups from Project site.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
- H. Continuous special inspection is required for all masonry work on this job according to CBC Section 2105.3.4, Unit Strength Method.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 7 days and concentrated loads for at least 14 days after building masonry walls or columns.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:
 - 1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

- a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
 - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.
- 2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
 - a. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
- 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements. Must be approved in writing by the Architect.

2.2 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.
 - 1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners, except where indicated as bullnose.
- B. Concrete Masonry Units: ASTM C 90 and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below:
 - a. 1900 psi average of three units, 1700 psi individual unit.
 - 2. Weight Classification: Medium weight (78 psf, fully grouted).
 - 3. Provide Type I, moisture-controlled units.
 - 4. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on Drawings:

- a. 8 inch nominal: 7-5/8 inch actual.
 - b. 12 inch nominal: 11-5/8 inch actual.
 - c. 16 inch nominal: 15-5/8 inch actual.
5. Exposed Faces: Split-Face from Manufacturer's full color range.
- a. Where units are to be left exposed, provide color and texture matching the range represented by Architect's sample.

2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Mortar Cement: ASTM C270
 - 1. For pigmented mortars, use premixed, colored mortar cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 5 percent of mortar cement by weight for mineral oxides nor 1 percent for carbon black.
 - 2. For colored-aggregate mortars, use mortar cement of natural color or white as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S and U.B.C. Standard 21-13.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
 - 1. For pigmented mortars, use colored portland cement-lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.
- E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 1. White-Mortar Aggregates: Natural white sand or ground white stone.
 - 2. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone, as required to match Architect's sample.
- F. Aggregate for Grout: ASTM C 404.
- G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- H. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.
- I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

- J. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMU, containing integral water repellent by same manufacturer.
- K. Water: Potable.
- L. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Colored Masonry Cement:
 - a. Brixment-in-Color; Essroc Materials, Inc.
 - b. Centurion Colorbond; Lafarge Corporation.
 - c. Lehigh Custom Color Masonry Cement; Lehigh Portland Cement Co.
 - d. Flamingo Color Masonry Cement; Riverton Corporation (The).
 - 2. Colored Portland Cement-Lime Mix:
 - a. Color Mortar Blend; Glen-Gery Corporation.
 - b. Centurion Colorbond PL; Lafarge Corporation.
 - c. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
 - d. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).
 - 3. Mortar Pigments:
 - a. True Tone Mortar Colors; Davis Colors.
 - b. Centurion Pigments; Lafarge Corporation.
 - c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.
 - 4. Cold-Weather Admixture:
 - a. Accelguard 80; Euclid Chemical Co.
 - b. Morset; Grace: W.R. Grace & Co.
 - 5. Water-Repellent Admixture:
 - a. Dry-Block Mortar Admixture; Grace: W.R. Grace & Co.
 - 6. SIKA Grout Aid II is required for all high lift grout construction.

2.4 REINFORCING STEEL

- A. Steel Reinforcing Bars: Refer to Specification Section 03300, Part 2, 2.2 "Reinforcing Materials".

2.5 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.
2. For dark-colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.
3. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.
4. Products: Subject to compliance with requirements, provide one of the following:
 - a. 202 New Masonry Detergent; Diedrich Technologies, Inc.
 - b. 200 Lime Solv; Diedrich Technologies, Inc.
 - c. 202V Vana-Stop; Diedrich Technologies, Inc.
 - d. Sure Klean No. 600 Detergent; ProSoCo, Inc.
 - e. Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
 - f. Sure Klean Vana Trol; ProSoCo, Inc.

2.6 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, in order to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
 1. For reinforced masonry and where indicated, use type indicated below:
 - a. Type: S having a minimum comprehensive strength of 1800 psi.
- D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
 1. Limit pigments to the following percentages of cement content by weight:
 - a. For mineral oxide pigments and masonry cement mortar, not more than 5 percent.
 - b. For carbon-black pigment and masonry cement mortar, not more than 1 percent.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.
 1. Mix to match Architect's sample.
- F. Grout for Unit Masonry: Comply with ASTM C476. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.
 1. Use fine grout in grout spaces less than 2 inches in horizontal dimension, unless otherwise indicated.
 2. Use coarse grout in grout spaces 2 inches or more in least horizontal dimension, unless otherwise indicated.

3. Grout shall have a minimum compressive strength of 2000 at 28 days.

2.7 SOURCE QUALITY CONTROL

- A. The Owner will employ and pay a qualified independent testing agency to perform the following testing for source quality control. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical

alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet, nor 1/2 inch maximum.

- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.
- E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch. Do not vary from collar-joint thickness indicated by more than minus 1/4 inch or plus 3/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

1. At exterior frames, insert extruded polystyrene board insulation around perimeter of frame in thickness indicated, but not less than 3/4 inch to act as a thermal break between frame and masonry.
- H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above and as follows:
 1. Install compressible filler in joint between top of partition and underside of structure above.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 1. With full mortar coverage on horizontal and vertical face shells.
 2. Bed webs in mortar in all courses.
 3. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.6 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
 1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 1. Fit bond-breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.

3.8 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 24 inches for block size units are shown without structural steel or other supporting lintels.

1. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.9 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
1. Do not exceed the following pour heights for coarse grout:
 - a. For minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 12 feet.
 2. Provide cleanout holes at least 3 inches in least dimension for grout pours over 24 inches in height.
 - a. Provide cleanout holes at each vertical reinforcing bar.
 3. Grouted construction shall be in accordance with Article 3.5 of TMS 602/ACI 530.1/ASCE 6.

3.10 FIELD QUALITY CONTROL

- A. The Owner will employ and pay a qualified independent testing agency to perform the following testing for field quality control. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar properties will be tested per property specification of ASTM C 270 and TMS 602/ACI 530.1/ASCE 6..
- D. Mortar composition and properties will be evaluated per ASTM C 780
- E. Grout will be sampled and tested for compressive strength per ASTM C 1019 and TMS 602/ACI 530.1/ASCE 6 .

- F. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B, and as follows:
1. A set of five masonry prisms shall be built and tested prior to the start of construction.
 2. A set of three prisms shall be built and tested during construction for each 5000 square feet of wall area.
- G. Evaluation of Quality-Control Tests: In the absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from construction quality-control tests comply with minimum requirements indicated.

3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.
- E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.12 MASONRY WASTE DISPOSAL

- A. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.

- B. Excess Masonry Waste: Remove excess, clean masonry waste and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes structural steel.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
 - 2. Division 5 Section "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings detailing fabrication of structural steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
- D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.
 - 1. Structural steel, including chemical and physical properties.
 - 2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
 - 3. Direct-tension indicators.
 - 4. Shop primers.

5. Nonshrink grout.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.
 1. Fabricator must be acceptable to both the Architect, Structural Engineer and the Chief Building Official.
- C. Comply with applicable provisions of the following specifications and documents:
 1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
 2. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
 3. AISC's "Seismic Provisions for Structural Steel Buildings."
 4. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
 5. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 6. 2001 Title 24 Part 2, California Building Code.
- D. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."
 1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
 2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 SEQUENCING

- A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel Shapes, Plates, and Bars: As follows:
 - 1. Miscellaneous Shapes: ASTM A 36.
 - 2. Plates: ASTM A 36.
- B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.
- C. Anchor Rods, Bolts, Nuts, and Washers: As follows:
 - 1. Formed Bolts and Rods: ASTM F1554, Grade 36; ; carbon-steel, hex-head bolts; and carbon-steel nuts.
 - 2. Washers: ASTM A 36.
- D. Non high-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.
 - 1. Finish: Plain, uncoated.
- E. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain
- F. Welding Electrodes: Comply with AWS requirements.

2.2 PRIMER

- A. Primer: SSPC-Paint 25; red iron oxide, zinc oxide, raw linseed oil and alkyd primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

2.3 GROUT

- A. Metallic, Shrinkage-Resistant Grout: Premixed, factory-packaged, ferrous aggregate grout, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time. Minimum 28-day compressive strength = 4000 psi.

2.4 FABRICATION

- A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
 - 1. Camber structural steel members where indicated.
 - 2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
 - 3. Mark and match-mark materials for field assembly.
 - 4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
 - 5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
 - 6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
- B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
 - 1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
 - 2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded.
- D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.
- E. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
 - 1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
 - 2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

2.5 SHOP CONNECTIONS

- A. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
 - 2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable

tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

2.6 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete or mortar.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed-on fireproofing.
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
 - 1. SSPC-SP 2 "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00" to provide a dry film thickness of not less than 1.5 mils. Finish paint all exposed steel elements. Color as selected by Architect.

2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

2.8 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
 - 2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- D. In addition to visual inspection, full and partial penetration groove shop-welded connections will be inspected and tested according to CBC Sections 2231A.4 and 2231A.5

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.
- B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
 - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - a. Comply with manufacturer's instructions for proprietary grout materials.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces

that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection.
- H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High Strength Bolts: Install High-Strength Bolts in accordance with "Specification for Structural Joints Using ASTM A325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug Tightened unless indicated as slip critical.
- B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports according to CBC Section 1701.3.
1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
- B. High-Strength Bolts: Connections will be inspected in accordance with "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" and CBC Section 1701.5.6.
- C. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

- D. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- E. In addition to visual inspection, field-welded connections will be inspected and tested according to CBC Section 1701.5.5.

3.6 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

END OF SECTION

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Interior load-bearing wall framing.
 - 2. Interior or Exterior load-bearing wall framing.
 - 3. Interior non-load bearing wall framing.
- B Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for sub-flooring, wall sheathing, or roof sheathing using wood-based structural-use panels, particleboard, fibrous-felted board, and foam-plastic sheathing.
 - 2. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing metal-stud framing and ceiling-suspension assemblies.

1.03 DEFINITIONS

- A Minimum Uncoated Steel Thickness: Minimum uncoated thickness of cold-formed framing delivered to the Project site shall be not less than 95 percent of the thickness used in the cold-formed framing design. Lesser thicknesses shall be permitted at bends due to cold forming.

1.04 SUBMITTALS

- A Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B Mill certificates signed by steel sheet producer [or test reports from a qualified independent testing agency] indicating steel sheet complies with requirements.
- C Welding Certificates: Copies of certificates for welding procedures and personnel.
- D Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
 - 1. Expansion anchors.
 - 2. Power-actuated anchors.
 - 3. Mechanical fasteners.
 - 4. Vertical deflection clips.
 - 5. Miscellaneous structural clips and accessories.

1.05 QUALITY ASSURANCE

- A Installer Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B Mill certificates signed by steel sheet producer [or test reports from a qualified independent testing agency] indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, [ductility,] and galvanized-coating thickness.
- C Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" [or "Load and Resistance Factor Design Specification for Cold-Formed Steel Structural Members" and the following] for calculating structural characteristics of cold-formed metal framing[.][:]
 - 1. CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections."

1.06 DELIVERY, STORAGE, AND HANDLING

- A Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
 - 1. American Studco, Inc.
 - 2. Angeles Metal Systems.
 - 3. California Metal Systems, Inc.
 - 4. Consolidated Fabricators Corp.
 - 5. Design Shapes in Steel.
 - 6. Dietrich Industries, Inc.
 - 7. Knorr Steel Framing Systems.
 - 8. Scafco Corp.
 - 9. Steel Developers, LLC.
 - 10. Studco of Hawaii, Inc.
 - 11. United Construction Supply
 - 12. Western Metal Lath.

2.02 MATERIALS

- A Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: 33 (230) for 18 gage and thinner.
 2. Grade: 50 (340) for 16 gage and thicker.
 3. Coating: G60 (Z180).

2.03 LOAD-BEARING WALL FRAMING

- A Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
1. Minimum Un-coated-Steel Thickness: 0.0329 inch (1.09 mm) or as shown on the structural drawings.
 2. Flange Width: 1-3/8 inches (35 mm).
 3. Section Properties: As shown on the structural drawings.
- B Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, complying with ASTM C 955, and as follows:
1. Minimum Uncoated-Steel Thickness: 0.0329 inch (1.37 mm) or as shown on the structural drawings.
 2. Flange Width: 1-1/4 inches (32 mm). or as shown on the structural drawings.

2.04 NON-LOAD-BEARING WALL FRAMING

- A Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
1. Minimum Uncoated-Steel Thickness: 0.0329 inch or as shown on the structural drawings.
 2. Flange Width: 1-3/8 inches (35 mm).
 3. Section Properties: As shown on the structural drawings.
- B Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, complying with ASTM C 955, and as follows:
1. Minimum Uncoated-Steel Thickness: 0.0329 inch or as shown on the structural drawings.
 2. Flange Width: 1-1/4 inches or as shown on the structural drawings
- C Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads, and as follows:
1. Minimum Uncoated-Steel Thickness: 0.0329 inch or as detailed on the structural drawings.
 2. Flange Width: As detailed on the structural drawings.

- D Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads, and as follows:
 - a) Minimum Uncoated-Steel Thickness: 0.0428 inch (1.09 mm) or as detailed on the structural drawings.
 - b) Flange Width: As detailed on the structural drawings.
 2. Inner Track: Of web depth indicated, and as follows:
 - a) Minimum Uncoated-Steel Thickness: 0.0329 inch or as detailed on the structural drawings.
 - b) Flange Width: As detailed on the structural drawings.

2.05 CEILING JOIST FRAMING

- A Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, complying with ASTM C 955, and as follows:
1. Minimum Uncoated-Steel Thickness: 0.0329 inch or as detailed on the structural drawings.
 2. Flange Width: 1-5/8 inches (41 mm).
 3. Section Properties: As detailed on the structural drawings

2.06 FRAMING ACCESSORIES

- A Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa).
- B Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. End clips.
 5. Stud kickers, knee braces, and girts.

2.07 ANCHORS, CLIPS, AND FASTENERS

- A Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- B Anchor Bolts: ASTM F 1554, Grade [36] threaded carbon-steel [hex-headed] bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by [hot-dip process according to ASTM A 153/A 153M, Class C.
- C Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

- D Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F Welding Electrodes: Comply with AWS standards.

2.08 MISCELLANEOUS MATERIALS

- A Galvanizing Repair Paint: ASTM A 780.

2.09 FABRICATION

- A Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - a) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b) Locate mechanical fasteners and install according to the structural drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to the structural drawings.
- B Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.
- C Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - a) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b) Locate mechanical fasteners and install according to the structural drawings, with screw penetrating joined members by not less than three exposed screw threads.
- E Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
- F Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.03 LOAD-BEARING WALL INSTALLATION

- A Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - a) Anchor Spacing: as shown on the structural drawings
- B Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 1. Stud Spacing: 16 inches (406 mm).
- C Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on structural drawings.
 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I Install horizontal bridging in stud system, spaced 48 inches (1219 mm) apart. Fasten at each stud intersection as indicated on the structural drawings.
 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle.

- J Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.04 NON-LOAD-BEARING WALL INSTALLATION

- A Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B Fasten both flanges of studs to [top and] bottom track, unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches (406 mm).
- C Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to [infill] studs and anchor to primary building structure.
- E Install horizontal bridging in wall studs, spaced in rows indicated on structural drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches (450 mm) of single deflection track.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable -wall-framing system.

3.05 FIELD QUALITY CONTROL

- A Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- B Field and shop welds will be subject to inspection and testing.
- C Testing agency will report test results promptly and in writing to Contractor ,Architect, Engineer, Project Inspector and D.S.A.
- D Remove and replace Work that does not comply with specified requirements.
- E Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

3.06 REPAIRS AND PROTECTION

- A Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B Protect paper-surfaced gypsum sheathing that will be exposed to weather for more than 30 days by covering exposed exterior surface of sheathing with a securely fastened air-infiltration barrier. Apply covering immediately after sheathing is installed.
- C Protect cutouts, corners, and joints in sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at time sheathing is applied.
- D Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Steel fabrications for exterior canopy.
 - 2. Steel pipe guardrails and gates.

1.03 SUBMITTALS

- A Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 1. Provide templates for anchors and bolts specified for installation under other Sections.

1.04 QUALITY ASSURANCE

- A Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.05 PROJECT CONDITIONS

- A Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.06 COORDINATION

- A Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

- A Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.02 FERROUS METALS

- A Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- C Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
- D Cast-in-Place Anchors in Concrete: 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 E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- E Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.03 PAINT

- A Shop Primers: Provide primers that comply with Division 9 Section "Painting."

2.04 FASTENERS

- A General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C Anchor Bolts: ASTM F 1554, Grade 36.
- D Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- E Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- G Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).
- H Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).

- I Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).
- J Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.05 GROUT

- A Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- B Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 FABRICATION, GENERAL

- A 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.
- B Shear and punch metals cleanly and accurately. Remove burrs.
- C Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E 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.
- F Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

- H Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- I Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- J Remove sharp or rough areas on exposed traffic surfaces.
- K Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.07 MISCELLANEOUS FRAMING AND SUPPORTS

- A General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B General: Provide steel framing and supports indicated and as necessary to complete the Work.
- C Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
 - 2. Furnish inserts if units must be installed after concrete is placed.
- D Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness, unless otherwise indicated.
 - 1. Unless otherwise indicated, provide 1/2-inch (12-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6-mm) top plates.

2.08 FINISHES, GENERAL

- A Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B Finish metal fabrications after assembly.

2.09 STEEL AND IRON FINISHES

- A Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- B Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, 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 surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.02 SETTING BEARING AND LEVELING PLATES

- A Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
- B Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified above for setting and grouting bearing and leveling plates.

3.04 ADJUSTING AND CLEANING

- A Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
1. Framing with dimension lumber.
 2. Framing with timbers.
 3. Framing with engineered wood products.
 4. Rooftop equipment bases and support curbs.
 5. Wood nailers, and blocking.
 6. Sheathing.
 7. Shop fabricated structural wood.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 6 Section "Finish Carpentry" for nonstructural carpentry items exposed to view and not specified in another Section.

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.
- B. Exposed Framing: Dimension lumber or timbers not concealed by other construction and indicated to receive a stained or natural finish.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for the following products:
1. Engineered wood products.
 2. Metal framing anchors.
 3. Construction adhesives.
- C. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:
1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
- D. Warranty of chemical treatment manufacturer for each type of treatment.

E. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Engineered wood products.
2. Metal framing anchors.
3. Power-driven fasteners.
4. Drilled-in anchors

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's and the Chief Building Official's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699 and 2001 CBC Title 24, Part 1, Section 4-333, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

B. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wood-Preservative-Treated Materials:
 - a. Baxter: J. H. Baxter Co.
 - b. Chemical Specialties, Inc.
 - c. Continental Wood Preservers, Inc.
 - d. Hickson Corp.
 - e. Hoover Treated Wood Products, Inc.
 - f. Osmose Wood Preserving, Inc.
2. Metal Framing Anchors:
 - a. Simpson Strong-Tie Company, Inc.
 - 1) All framing hardware specified on the drawings is based on the allowable loads for Simpson Strong-Tie. No substitutions will be accepted.
3. Shop Fabricated Wood Structural Wood:
 - a. Redbuilt, LLC in accordance with ICC ESR-2993, or approved equal.

2.2 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority (Canadian).
3. RIS - Redwood Inspection Service.
4. SPIB - Southern Pine Inspection Bureau.
5. WCLIB - West Coast Lumber Inspection Bureau.
6. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

1. Provide dressed lumber, S4S, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPAC2 (lumber) and AWPAC9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.
2. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPAC4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.4 DIMENSION LUMBER

A. Dimension lumber shall have a 19% maximum moisture content at the time of installation.

B. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

C. Non-Load-Bearing Interior Partitions: Provide framing of the following grade and species:

1. Grade: No. 2.
2. Species: Douglas fir-larch; WCLIB or WWPA.

D. Exterior and Load-Bearing Walls: Provide framing of the following grade and species:

1. Grade: No. 2.
2. Species: Douglas fir-larch; WCLIB or WWPA.

E. Roof Rafters and Headers: Provide framing of the following grade and species:

1. Grade: No. 1 and better.
2. Species: Douglas fir-larch; WCLIB or WWPA.

F. Ceilings (Non-Load-Bearing): For ceiling framing that does not support a floor, roof, or attic, provide the following grade and species:

1. Grade: No. 1.
2. Species: Douglas fir-larch; WCLIB or WWPA.

G. Other Non Exposed Framing Not Listed Above: Provide the following grades and species:

1. Grade: No. 1.
2. Species: Douglas fir-larch; WCLIB or WWPA.

H. Exposed Framing: Provide material hand-selected from lumber of species and grade indicated below for uniformity of appearance and freedom from characteristics that would impair finish appearance.

1. Species and Grade: Douglas fir-larch, No. 1 or better; WCLIB or WWPA.

2.5 TIMBERS

A. For timbers of 5-inch nominal size and thicker, provide material complying with the following requirements:

1. Species and Grade: Douglas fir-larch, No. 1 or better per WCLIB or WWPA rules.
 - a. Moisture content shall be 19% or less at the time of installation.

2.6 BOARDS

A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 19 percent maximum moisture content and of following species and grade:

1. Species and Grade: Douglas fir-larch, No.1 or better per WCLIB or WWPA rules.

2.7 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide Douglas Fir-Larch No. 2. For board-size lumber, provide Douglas Fir-Larch No. 2.

2.8 WOOD-BASED STRUCTURAL-USE PANELS, GENERAL

- A. Structural-Use Panel Standard: Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood." (5 ply minimum, manufactured using exterior glue)
- B. Trademark: Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements.

2.9 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

- A. General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).
 - 1. Thickness: Provide panels meeting requirements specified but not less than thickness indicated.
 - 2. Span Ratings: Provide panels with span ratings required to meet provisions of APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial."
- B. Wall and Roof Sheathing: PS-1 plywood APA-rated sheathing (CD EXTERIOR).
Span index = 32/16.
Thickness = ½ inch.
- C. Floor Sheathing: PS-1 plywood APA-rated sheathing (CD EXTERIOR).
Span index = 48/24.
Thickness = ¾ inch.

2.10 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
 - 2. Where fasteners contact galvanized steel, provide galvanized fasteners.
 - 3. Where fasteners contact stainless steel, provide stainless steel fasteners.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105, common wire nails only; no box nails.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.11 METAL FRAMING ANCHORS

A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.
2. Simpson Strong Tie products. No substitutions will be accepted.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

2.12 MISCELLANEOUS MATERIALS

A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbonate (IPBC) as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. "Table 23A-11-B-1 Nailing Schedule" of the CBC unless otherwise indicated.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

G. Drive diaphragm sheathing fasteners flush but do not fracture the surface of the sheathing.

H. Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.

I. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

3.2 WOOD NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

3.3 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Install framing members of size and at spacing indicated.
- D. Do not splice structural members between supports.

3.4 WALL AND PARTITION FRAMING

- A. General: Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs unless otherwise indicated.. Nail or anchor plates to supporting construction, unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-6-inch nominal-size wood studs spaced 16 inches o.c., except where otherwise indicated or required.
 - 2. For interior partitions and walls, provide 2-by-6-inch nominal-size wood studs spaced 16 inches o.c., except where otherwise indicated or required.
- B. Construct corners and intersections with 3 or more studs. Provide miscellaneous blocking and framing as shown and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide continuous horizontal blocking at midheight of single-story partitions over 96 inches high and multistory partitions, using members of 2-inch nominal thickness and of same width as wall or partitions.
- C. Frame openings with multiple studs and headers; provide nailed header members of thickness equal to width of studs; and set headers on edge and support on jamb studs unless otherwise indicated.
 - 1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal depth for openings 36 inches and less in width, and not less than 6-inch nominal depth for wider openings.
 - 2. For load-bearing walls, provide headers and jambs as indicated.

3.5 RAFTER AND CEILING JOIST FRAMING

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers unless otherwise indicated.

1. At valleys, provide valley rafters as indicated. Bevel ends of jack rafters for full bearing against valley rafters.
 2. At hips, provide hip rafter of size shown. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as shown. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as shown for eaves, overhangs, dormers, and similar conditions, if any.

3.6 TIMBER FRAMING

- A. Install timber framing with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports if not continuous.
- B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.
- C. Where built-up beams or girders of 2-inch nominal-dimension lumber on edge are shown, fasten together with 2 rows of 20d nails spaced not less than 32 inches o.c. Locate one row near top edge and other near bottom edge. Locate end joints in members over supports; for continuous members, stagger ends at quarter points between supports.
- D. Install wood posts using metal anchors indicated.
- E. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.7 INSTALLATION OF STRUCTURAL-USE PANELS

- A. General: Comply with applicable recommendations contained in APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
1. Comply with "Code Plus" provisions of above-referenced guide.
- B. Fastening Methods: Fasten panels as indicated below:
1. Sheathing: Nail to framing.
 - a. Space panels 1/8 inch at edges and ends.

END OF SECTION

SECTION 06 17 53 – SHOP FABRICATED WOOD TRUSSES

PART 1. - PART 1 - GENERAL

1. RELATED DOCUMENTS

- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1. SUMMARY

- a) This Section includes wood roof and girder trusses and truss accessories.
- b) Related Sections include the following:
- c) Division 6 Section "Rough Carpentry" for roof sheathing and subflooring and dimension lumber for supplementary framing and permanent bracing.

2. DEFINITIONS

- a) Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- b) Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.

3. PERFORMANCE REQUIREMENTS

- a) Structural Performance: Provide metal-plate-connected wood trusses as designed and detailed on the structural drawings.
 - 1. Design Loads: As indicated on the structural drawings.
 - 2. Maximum Deflection Under Design Loads:
 - b) Roof Trusses: Vertical deflection of L/240 of span for dead load plus live load vertical deflection of L/360 of span for live load only.

4. SUBMITTALS

- a) Product Data: For metal-plate connectors, metal framing anchors, bolts, and fasteners.

- b) Shop Drawings: Show location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber; splice details; type, size, material, finish, design values, orientation, and location of metal connector plates; and bearing details as shown on the structural drawings.
- 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - c) Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- 1. All truss members are to be fabricated with Douglas fir – larch No. 1 members
 - d) Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
- 1. Metal-plate connectors fabricated by Mitek Industries, Inc.

5. QUALITY ASSURANCE

- a) Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in TPI 1.
- 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
- 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

Note: Metal plate connectors are to be manufactured by Mitek Industries, Inc., or approved equal.

- b) Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that involves inspection by SPIB, Timber Products Inspection, TPI, or other independent testing and inspecting agency acceptable to Architect and the Chief Building Official.
- c) Source Limitations for Connector Plates: Obtain metal connector plates through Mitek Industries, Inc. or approved equal
- d) Comply with applicable requirements and recommendations of the following publications:
 - 1. TP1 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- e) Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

6. DELIVERY, STORAGE, AND HANDLING

- a) Comply with TPI recommendations to avoid damage and lateral bending. Provide for air circulation around stacks and under coverings.
- b) Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

7. COORDINATION

- a) Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2. - PART 2 - PRODUCTS

1. MANUFACTURERS

- a) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Metal Connector Plates:

- b) Mitek Industries, Inc. or approved equal.

1. Metal Framing Anchors:

- c) Simpson Strong-Tie Company, Inc. or approved equal.

2. DIMENSION LUMBER

- a) Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

- 1. Factory mark each piece of lumber with grade stamp of grading agency.
- 2. For exposed lumber indicated to receive natural or stained finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
- 3. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified.
- 4. Provide dry lumber with 11 percent minimum and 19 percent maximum moisture content at time of fabrication. Green lumber is not allowed.

- b) Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

- c) Grade and Species: Provide visually graded dimension lumber for truss chord and web members, of the following grade and species:

1. Grade for Chord Members: No. 1.
2. Grade for Web Members: No. 1
3. Species: Douglas fir-larch; WCLIB or WWPA

Note: All truss members must be fabricated with Douglas fir-larch members

3. METAL CONNECTOR PLATES

- a) General: Fabricate connector plates to comply with TPI 1 from metal complying with requirements indicated below:
- b) Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M, G60 coating designation; Designation SS, Grade 33, and not less than 0.036 inch thick.

4. FASTENERS

- a) General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - b) Nails, Wire, Brads, and Staples: FS FF-N-105.
 - c) Power-Driven Fasteners: CABO NER-272.
 - d) Wood Screws: ASME B18.6.1.
 - e) Lag Bolts: ASME B18.2.1.
 - f) Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
 - g) Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

5. METAL FRAMING ANCHORS

- a) General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.

- b) Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

6. MISCELLANEOUS MATERIALS

- a) Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

7. FABRICATION

- a) Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- b) Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- c) Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
- d) Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

- 1. NOTE: An 8d x 1½" long ring shanked nail shall be installed through each plate to each member

PART 3. - PART 3 - EXECUTION

1. INSTALLATION

- a) Install wood trusses only after supporting construction is in place and is braced and secured.
- b) Before installing, splice trusses delivered to Project site in more than one piece.
- c) Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- d) Install and brace trusses according to TPI recommendations and as indicated.
- e) Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- f) Space trusses as indicated; adjust and align trusses in location before permanently fastening.

- g) Anchor trusses securely at bearing points; use metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
 - h) Securely connect each truss ply required for forming built-up girder trusses.
 - i) Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - j) Install wood trusses within installation tolerances in TPI 1.
 - k) Do not cut or remove truss members.
 - l) Replace wood trusses that are damaged or do not meet requirements.
1. Do not alter trusses in field.

2. SPECIAL INSPECTION

- a) The fabrication of trusses and other assemblages constructed using wood and metal members, or using light metal plate connectors, shall be continuously inspected by a qualified inspector approved by the Chief Building Official. The inspector shall furnish the architect, structural engineer and the Chief Building Official with a report that the lumber species, grades and moisture content; type of glue, temperature and gluing procedure; type of metal members and metal plate connectors; and the workmanship confirm in every material respect with the duly approved plans and specifications. Each inspected truss shall be stamped by the inspector with an identifying mark.

3. REPAIRS AND PROTECTION

- a) Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION

SECTION 06 18 00 - STRUCTURAL GLUED-LAMINATED TIMBER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. New roof framing members below mechanical units / equipment.

1.3 DEFINITIONS

- A. Structural Glued-Laminated (Glulam) Timber: An engineered, stress-rated timber product assembled from selected and prepared wood laminations bonded together with adhesives with the grain of the laminations approximately parallel longitudinally.

1.4 SUBMITTALS

- A. Product Data: For glulam timber and accessories. Include installation instructions and data on lumber, adhesives, fabrication, treatment, and protection.
- B. Shop Drawings: Show layout of structural glulam timber system and full dimensions of each member. Indicate species and laminating combination, adhesive type, and other variables in required Work.
- C. Certificates of Conformance: Issued by a qualified inspection and testing agency indicating that glu-lam timbers comply with requirements of AITC A190.1 & 2001 CBC Sections 2303.1.3.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed structural glulam timber construction similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Provide factory-glued structural units produced by an AITC-licensed firm.
1. Factory mark each piece of structural glulam timber with AITC Quality Mark. Place mark on surfaces that will not be exposed in completed Work.
- C. Quality Standard: Comply with AITC A190.1, "Structural Glued Laminated Timber" and 2001 CBC Sections 2303.1.3.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with provisions of AITC 111, "Recommended Practice for Protection of Structural Glued Laminated Timber during Transit, Storage, and Erection."
- B. Individually wrap members with plastic-coated paper covering, with water-resistant seams, before shipping or exposing to outdoor conditions.

PART 2 - PRODUCTS

2.1 STRUCTURAL GLULAM TIMBER FRAMING

- A. Species and Grades for Beams, Purlins, and Arches: Provide glulam members of the following species that comply with AITC 117--MANUFACTURING for the following combination symbol:
 - 1. Species and Combination Symbol for simple spans: Douglas fir, 24FV4.
 - 2. Species and Combination Symbol for cantilevered spans: Douglas fir, 24FV8.
- B. Appearance Grade: Provide "Architectural" appearance grade members complying with AITC 110, where exposed.
- C. Adhesive: Wet-use type complying with ASTM D 2559.
- D. Connectors, Anchors, and Accessories: Fabricate from structural-steel shapes, plates, and bars complying with ASTM A 572, Grade 50.
 - 1. Provide bolts, 3/4 inch, unless otherwise indicated, complying with ASTM A 307, Grade A; nuts complying with ASTM A 563; and, where indicated, flat washers.
 - 2. Finish each assembly and fastener with rust-inhibitive primer, 2-mil dry film thickness.

2.2 FABRICATION

- A. Camber: Fabricate horizontal and inclined members, units of less than 1:1 slope, with either circular or parabolic camber as indicated.
- B. Moisture content at time of fabrication and reinforcing installation shall not exceed eleven percent (11%).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Erect structural glulam timber framing true and plumb, with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
 - 1. Use padded slings and protect corners with wood blocking.
- B. Fit structural glulam timber framing by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.
 - 1. Use connectors as templates for drilling bolt holes.

- C. Install steel connectors, anchors, and accessories as indicated.

3.2 ADJUSTING AND CLEANING

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged structural glulam timber if repairs are not approved by Architect.

3.3 PROTECTION

- A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, soiling, and damage from work of other trades.

END OF SECTION

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Plastic-laminate and laminate metal cabinets.
 - 2. Plastic-laminate and laminate metal countertops.
 - 3. Solid Surface Countertops
- B Related Sections include the following:
 - 1. Division 9 Section "Gypsum Board Assemblies".

1.03 DEFINITIONS

- A Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.04 SUBMITTALS

- A Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in architectural woodwork.
 - 3. Apply WIC-certified compliance label to first page of Shop Drawings.
- B Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- C Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- C Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.
- D Quality Standard: Unless otherwise indicated, comply with WIC's "Manual of Millwork" for grades of interior architectural woodwork, construction, finishes, and other requirements.
- E Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.07 PROJECT CONDITIONS

- A Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and will maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.
- C Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

- A Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

- A General: Provide materials that comply with requirements of the WIC quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- C High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: UON, Architect shall chose high-pressure decorative laminate colors & patterns form any of the following manufacturers:
 - a) Formica Corporation.
 - b) Wilsonart International; Div. of Premark International, Inc.
 - c) Nevermar
 - d) Pionite
- D Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
- E Adhesive for Bonding Plastic Laminate: PVA.
- F Metal Laminate (where indicated):
 - 1. Manufacturer: Moz Designs, Color and Finish as selected by Architect from Manufacturer's full range.
- G. Solid Surface
 - 1. Manufacturer: UON, Architect shall chose solid surface countertop colors & patterns form any of the following manufacturers:
 - a) Formica Corporation.
 - b) Wilsonart International; Div. of Premark International, Inc.
 - c) Nevermar
 - d) Pionite
 - e) Avonite

2.02 FIRE-RETARDANT-TREATED MATERIALS

- A General: Where indicated, use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.
 - 1. Do not use treated material that does not comply with requirements of referenced woodworking standard or that is warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- B Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with AWPA C20 (lumber) and AWPA C27 (plywood), for woodwork items indicated as fire-retardant treated. Use the following treatment type:
 - 1. Exterior Type: Organic-resin-based formulation thermally set in wood by kiln-drying.
 - 2. Interior Type A: Low-hygroscopic formulation.

2.02 CABINET HARDWARE AND ACCESSORIES

- A Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
- B Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C Wire Pulls: Back mounted, 4 inches (100 mm) long, 5/16 inches (8 mm) in diameter.
- D Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- E Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following loads:
 - 1. Box Drawer Slides: 75 lbf (330 N).
 - 2. File Drawer Slides: 150 lbf (670 N).
 - 3. Pencil Drawer Slides: 45 lbf (200 N).
 - 4. Keyboard Slide: 75 lbf (330 N).
- F Drawer Locks: BHMA A156.11, E07041.
- G Grommets for Cable Passage through Countertops: 1-1/4-inch (32-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Product: Subject to compliance with requirements, provide "OG series" by Doug Mockett and Co., Inc.
- H Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - 2. Satin Stainless Steel: BHMA 630.
- I For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- J Aluminum reveals – 3/4" typ, UON.

2.04 INSTALLATION MATERIALS

- A Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.05 FABRICATION, GENERAL

- A Interior Woodwork Grade: Provide Custom grade interior woodwork complying with the referenced quality standard.
- B Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

- C Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less: 1/16 inch (1.5 mm).
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).
 - 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm).
- D Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.06 PLASTIC-LAMINATE CABINETS

- A Quality Standard: Comply with WIC Section 15.
- B WIC Construction Style: Style A, Frameless.
- C WIC Construction Type: Type I, multiple self-supporting units rigidly joined together.
- D WIC Door and Drawer Front Style: Flush overlay.
- E Reveal Dimension: 1/2 inch (13 mm).
- F Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: HGS.
 - 2. Postformed Surfaces: HGP.
 - 3. Vertical Surfaces: VGS.
 - 4. Edges: HGS .
- G Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS .
 - 2. Drawer Sides and Backs: Thermoset decorative overlay.
 - 3. Drawer Bottoms: Thermoset decorative overlay.
- H Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Match color, pattern, and finish as indicated by laminate manufacturer's designations for these characteristics.
 2. Match Architect's sample.
 3. Provide Architect's selections from laminate manufacturer's full range of colors and finishes in the following categories:
 - a) Solid colors.
 - b) Solid colors with core same color as surface.
 - c) Wood grains.
 - d) Patterns.
- I Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.07 PLASTIC-LAMINATE COUNTERTOPS

- A Quality Standard: Comply with WIC Section 16.
- B High-Pressure Decorative Laminate Grade: HGS.
- C Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. Match color, pattern, and finish as indicated by manufacturer's designations for these characteristics.
 2. Match Architect's sample.
 3. Provide Architect's selections from manufacturer's full range of colors and finishes in the following categories:
 - a) Solid colors.
 - b) Solid colors with core same color as surface.
 - c) Wood grains.
 - d) Patterns.
- D Grain Direction: Parallel to cabinet fronts.
- E Edge Treatment: Same as laminate cladding on horizontal surfaces .
- F Core Material: Particleboard or medium-density fiberboard .
- G Core Material at Sinks: Particleboard made with exterior glue, medium-density fiberboard made with exterior glue, or exterior-grade plywood.

2.08 SOLID SURFACE COUNTERTOPS

- A Quality Standard: Comply with WIC Section 16.
- B Solid Surface Material
- C Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. Match color, pattern, and finish as indicated by manufacturer's designations for these characteristics.
 2. Match Architect's sample.
 3. Provide Architect's selections from manufacturer's full range of colors and finishes in the following categories:
 - a) Solid colors.
 - b) Solid colors with core same color as surface.

- c) Wood grains.
- d) Patterns.
- D Grain Direction: Parallel to cabinet fronts, UON
- E Edge Treatment: Same as laminate cladding on horizontal surfaces .

PART 3 - EXECUTION

3.01 PREPARATION

- A Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

- A Quality Standard: Install woodwork to comply with WIC Section 26 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- F Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.

3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

3.03 ADJUSTING AND CLEANING

- A Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B Clean, lubricate, and adjust hardware.
- C Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07 21 00 - BUILDING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Exterior cavity wall thermal insulation.
 - 2. Interior cavity wall insulation.
 - 3. Underside of roof deck thermal insulation. (Above suspended ceiling tiles)
 - 4. Recycled Cotton Insulation
- B Related Sections include the following:
 - 1. Division 9 Sections "Gypsum Board Assemblies" for installation in metal-framed assemblies of insulation specified by reference to this Section.

1.03 SUBMITTALS

- A Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A Source Limitations: Obtain each type of building insulation through one source.
- B Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.

1.05 DELIVERY, STORAGE, AND HANDLING

- A Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Glass-Fiber Insulation, Cotton batt where indicated:
 - a) CertainTeed Corporation.
 - b) Johns Manville Corporation.
 - c) Owens Corning.

2.02 INSULATING MATERIALS

- A Basis of Design Product: Products are based on the named manufacturer or an approved comparable product and manufacturer.
 - 1. Exterior cavity wall thermal insulation: Thermal Batt Insulation, foil faced, R-19.
 - 2. Interior cavity wall insulation: Sound Attenuation Batt Insulation, unfaced.(R-13). All interior walls are insulated.
 - 3. Thermal insulation at underside of roof deck(Above suspended ceiling tiles): Owens Corning, Thermal Batt Insulation, foil faced, Refer to Mechanical drawings for R-value. Default to R-38 if no R-value given.
 - 4. Rigid Insulation Board: 1 ½" thick at membrane roof locations.

2.03 INSULATION FASTENERS

- A Products: Subject to compliance with requirements, provide one of the following:
 - 1. Adhesively Attached, Spindle-Type Anchors:
 - a) AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b) Gemco; Spindle Type.
 - 2. Anchor Adhesives: -
 - a) AGM Industries, Inc.; TACTOO Adhesive.
 - b) Gemco; Tuff Bond Hanger Adhesive.
- B Insulation-Retaining Washers: Install at bottom of roof decking, self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.
- C Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.03 INSTALLATION, GENERAL

- A Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.

- C Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF GENERAL BUILDING INSULATION

- A Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- C Install insulation on roof decking substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. After adhesive has dried, install insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.

3.05 PROTECTION

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

END OF SECTION

SECTION 07 41 13 - METAL ROOF PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Factory-formed and field-assembled, standing-seam metal roof panels.
- B Related Sections include the following:
 - 1. Division 7 Section "Metal Wall Panels" for factory-formed metal soffit panels.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for fasciae, copings, flashings and other sheet metal work not part of metal roof panel assemblies.
 - 3. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.03 DEFINITIONS

- A Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.04 PERFORMANCE REQUIREMENTS

- A General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 SUBMITTALS

- A Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.
- B Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details.

1. Accessories: Include details of the following items:

- a) Flashing and trim.
- b) Gutters.
- c) Downspouts.

1.06 QUALITY ASSURANCE

- A Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.
- B Product Options: Drawings indicate size, profiles, and dimensional requirements of metal roof panels and are based on the specific system indicated.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.07 DELIVERY, STORAGE, AND HANDLING

- A Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.08 PROJECT CONDITIONS

- A Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.
- B Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.

1.09 WARRANTY

- A Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 UNDERLAYMENT MATERIALS

- A Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.
- B Slip Sheet: Building paper, minimum 5 lb/100 sq. ft. (0.24 kg/sq. m), rosin sized.

2.02 MISCELLANEOUS MATERIALS

- A Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.
 - 1. Fasteners for Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
- B Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.03 CONCEALED-FASTENER, LAP-SEAM METAL ROOF PANELS

- A General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B Standing-Seam-Profile, Concealed-Fastener Metal Roof Panels: Formed with raised, curved-top, standing-seam-shaped major rib at panel edge and intermediate stiffening ribs symmetrically spaced between major rib and panel edge.
 - 1. Material: Aluminum-zinc alloy-coated steel sheet, 0.0159 inch to 0.0209 inch thick. 24 ga. *Design Span* as Manufactured by AEP Span
 - a) Exterior Finish: Fluoropolymer.
 - b) Color: As selected by Architect from manufacturer's full range.
 - 2. Panel Coverage: 17 inches (406 mm)
 - 3. Panel Height: 1.0 inch (25 mm)
 - 4. Uplift Rating: UL 30.

2.04 ACCESSORIES

- A Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

- B Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
- C Gutters: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced 48 inches o.c., fabricated from same metal as gutters. Provide bronze, copper, or aluminum wire ball strainers at outlets. Finish gutters to match roof fascia and rake trim.

2.05 FABRICATION

- A General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.

2.06 FINISHES, GENERAL

- A Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- B Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.03 UNDERLAYMENT INSTALLATION

- A Felt Underlayment: Install felt underlayment and building-paper slip sheet on roof sheathing under metal roof panels, unless otherwise recommended by metal roof panel manufacturer. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under metal roof panels. Apply at locations indicated below, in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
 - 1. Apply from eave to ridge.
- B Apply slip sheet over underlayment before installing metal roof panels.

3.04 METAL ROOF PANEL INSTALLATION, GENERAL

- A General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cutting of metal roof panels by torch is not permitted.
 - 2. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 - 3. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 4. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.
- B Fasteners:
 - 1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.
- C Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.

3.05 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION

- A Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
- B Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.06 ACCESSORY INSTALLATION

- A General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- C Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet (1.2 m) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

3.07 FIELD QUALITY CONTROL

- A Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

3.08 CLEANING AND PROTECTION

- A Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- B Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 42 13 - METAL WALL PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Factory-formed and field-assembled, exposed-fastener, lap-seam metal wall panels.
- B Related Sections include the following:
 - 1. Division 7 Section "Sheet Metal Flashing and Trim" for fasciae, copings, flashings and other sheet metal work not part of metal wall panel assemblies.

1.03 DEFINITION

- A Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight system.

1.04 PERFORMANCE REQUIREMENTS

- A General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. (300 Pa) and not more than 12 lbf/sq. ft. (575 Pa).
- C Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
- D Thermal Movements: Provide metal wall panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 SUBMITTALS

- A Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.
- B Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
 - a) Flashing and trim.

- C Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

- A Source Limitations: Obtain each type of metal wall panel through one source from a single manufacturer.
- B Product Options: Drawings indicate size, profiles, and dimensional requirements of metal wall panels and are based on the specific system indicated.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.07 DELIVERY, STORAGE, AND HANDLING

- A Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.

1.08 WARRANTY

- A Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MISCELLANEOUS MATERIALS

- A Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
 - 1. Fasteners for Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.

2.02 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

- A General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 - 1. 24 ga. Nu-wave Corrigated, as manufactured by AEP Span. (install on a diagonal)
 - a) Fabricate metal wall reveals of same finish as wall panel as indicated on dwgs (break mtl).
 - b) Exterior Finish: Fluoropolymer.
 - c) Color: As selected from manufacturer's full range.
 - d) Panel Coverage: 32 inches (813 mm)], where applicable.
 - e) Panel Height: 1.375 inches (35 mm)], where applicable.
 - 2. 24 ga. Prestige (R-0 full 12" panel), as manufactured by AEP Span. (soffit)
 - a) Exterior Finish: Fluoropolymer.
 - b) Color: As selected by Architect from manufacturer's full range.

2.03 ACCESSORIES

- A Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
- B Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.04 FABRICATION

- A General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.

2.05 FINISHES, GENERAL

- A Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
- B Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."
- C Install fasciae and copings to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.03 METAL WALL PANEL INSTALLATION, GENERAL

- A General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cutting of metal wall panels by torch is not permitted.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.
 - 3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
 - 4. Install screw fasteners in predrilled holes.
 - 5. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 6. Install trim as metal wall panel work proceeds.
 - 7. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

3.04 FIELD-ASSEMBLED METAL WALL PANEL INSTALLATION

- A Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - 2. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

3.05 ERECTION TOLERANCES

- A Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.06 CLEANING AND PROTECTION

- A Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 46 46 – FIBER CEMENT BOARD SIDING

PART 1 GENERAL

1.1 Section Includes

- A. Siding panels.
- B. Accessories and trim.

1.2 Related Sections

- A. Section 06100 - Rough Carpentry: Framing and Sheathing.
- B. Section 07900 - Joint Sealers.
- C. Section 09900 – Painting .

1.3 References

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- B. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards; 1999.
- C. ASTM C 1186 - Standard Specification for Flat Non-Asbestos Fiber Cement Sheets; 1999.
- D. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 1998.
- E. ASTM E 84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 1999.
- F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.
- G. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 1999.
- H. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials With a Vitreous Silica Dilatometer; 1995.
- I. ASTM G 26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1996.
- J. ASTM E 330-97 – Structural Performance of exterior windows, curtain walls and doors by uniform static air pressure difference.

1.4 Submittals

- A. Make submittals under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods, including nailing patterns.
 - 4. Applicable model code authority evaluation report (ICC, CCMC, etc.)
- C. Siding manufacturer's requirements for vapor retarders, primer, paint, etc.
- D. Maintenance and periodic inspection recommendations.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 Quality Assurance

- A. Installer Qualifications: Provide installer with not less than three years of experience with products similar to those specified.

1.6 Delivery, Storage, And Handling

- A. Store products off the ground, on a flat surface, and under a roof or separate waterproof covering.

1.7 WARRANTY

- A. Provide Allura 50 year limited siding warranty.
- B. Allura ColorMax Finish – provide 15 year limited paint warranty
- C. Register manufacturer's warranty, made out in Owner's name, with copy to Owner

PART 2 PRODUCTS

2.1 Manufacturer

- A. Allura of Plycem, 15055 Woodham Drive Houston, Texas 77073
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 Panels

A. Fiber Cement Board Panels - General: Allura Fiber Cement Board Panels consist of cement, recycled content and cellulose fiber formed under high pressure into boards with integral surface texture; complying with ASTM C 1186 Type A Grade II; machined edges; for nail attachment.

1. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 5, maximum; when tested in accordance with ASTM E 84 (Class I/A).
2. Flammability: Noncombustible, when tested in accordance with ASTM E 136.
3. Flexural Strength: At least 1450 psi (10 MPa) when in equilibrium condition, and at least 1015 psi (7 MPa) when in wet condition, tested in accordance with ASTM C 1185.
4. Coefficient of Thermal Expansion: Less than 1×10^{-5} /inch/inch/degree F (0.5×10^{-5} /degree C), when tested in accordance with ASTM E 228.
5. Freeze Thaw Resistance: At least 80 percent flexural strength retained, when tested in accordance with ASTM C 1185.
6. UV Resistance: No cracking, checking, or erosion, when tested for 2000 hours in accordance with ASTM G 26.
7. Water Tightness: No water droplets on underside, when tested in accordance with ASTM C 1185.

B. Horizontal Siding: Allura Lap Siding.

1. Thickness: 5/16 inch (7.9 mm), plus or minus .04 inch (1 mm).
2. Length: 12 feet (3657 mm), plus 0, minus 1/8 inch (3 mm).
3. Style A : Smooth lap siding.
 - a. Width: 8-1/4 inches (210 mm) wide.
 - b. Sealant/Primer: Our Primary Sealant/Primer.
 - c. Field Finish Paint: 100 percent acrylic latex as specified in Section 09900.
4. Style B: Cedar lap siding.
 - a. Width: 8-1/4 inches (210 mm) wide.
 - b. Sealant/Primer: Our primary Sealant/Primer. 07466 / 4
 - c. Factory Stain Finish: Factory applied Allura Fiber Cement Siding Premium Stain color as follows: Blend of 35%Mahogany & 65% Maple.

C. Trim: Allura Trim/Fascia Board

1. Size:
 - a. Thickness 7/16 inch (11 mm) plus or minus (1 mm).
 - b. Width: 3-1/2 inch (89 mm).
 - c. Length: 12 feet (3.657 m) plus or minus 1/8 inch (3.17 mm).
2. Sealant/Primer: Our primary Sealant/Primer.
3. Provide the following trim:
 - a. Starter strip for lap siding.
 - b. Outside corners, butted to siding.
 - c. Outside corners, overlapping siding.
 - d. Fascia board.
 - e. Stain / Paint color to match adjacent surface.

D. Sealant: Paintable, 100 percent acrylic latex caulk complying with ASTM C 920.

E. Sheet Metal Flashing: Minimum 26 gauge hot-dipped galvanized steel sheet, or coated aluminum.

- F. Nails: Length as required to penetrate minimum 1-1/4 inch (32mm) into solid backing; hot-dipped galvanized or stainless steel.
- G. Building Paper: Kraft or bituminous paper; not polyethylene or foil.

PART 3 EXECUTION

3.1 Examination

- A. Prior to commencing installation, verify governing dimensions of building and condition of substrate.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 Preparation

- A. Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.3 Installation

- A. Install in accordance with manufacturer's instructions and Drawing details.
 - 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 - 3. Use trim details indicated on drawings.
 - 4. Touch up all field cut edges before installing.
 - 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood Studs Without Sheathing: Install building paper over studs prior to installing siding.
- C. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
 - 1. For sheathing of 1 inch (25 mm) thickness or less, nail through sheathing into studs using correspondingly longer nails. 07466 / 8 self-tapping, corrosion-resistant ribbed bugle head screws. Attach siding at each stud insuring that at least 3 screw threads penetrate the studs.
- D. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- E. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- F. Install sheet metal flashing above door and window casings and horizontal trim in field of siding.
- G. Do not install siding less than 6 inches (150 mm) from surface of ground nor closer than 1 inch (25 mm) to roofs, patios, porches, and other surfaces where water may collect.
- H. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.
- I. Finish Painting: Within 24 months after installation, paint siding and trim with one coat finish paint.
- J. Finish Painting: Within 24 months after installation, paint siding and trim with one coat primer and two coats finish paint.

3.4 Cleaning

- A. At completion of work, remove debris caused by siding installation from project site.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Mechanically fastened membrane roofing system.
 - 2. Vapor retarder.
 - 3. Roof insulation.
 - 4. Dens Deck
- B Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking and for wood-based, structural-use roof deck panels.
 - 2. Division 7 Section "Building Insulation" for insulation beneath the roof deck.
 - 3. Division 7 Section "Joint Sealants."

1.03 DEFINITIONS

- A Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.04 PERFORMANCE REQUIREMENTS

- A General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.

1.05 SUBMITTALS

- A Product Data: For each type of product indicated.
- B Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.

- C Maintenance Data: For roofing system to include in maintenance manuals.
- D Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

- A Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B Manufacturer Qualifications: A qualified manufacturer that has UL listing for membrane roofing system identical to that used for this Project.
- C Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class B; ASTM E 108, for application and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- D Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:
 - 1. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 4. Review structural loading limitations of roof deck during and after roofing.
 - 5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 6. Review governing regulations and requirements for insurance and certificates if applicable.
 - 7. Review temporary protection requirements for roofing system during and after installation.
 - 8. Review roof observation and repair procedures after roofing installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 - C Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 - D Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- 1.08 PROJECT CONDITIONS
- A Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- 1.09 WARRANTY
- A Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, vapor retarder, and other components of membrane roofing system.
 2. Warranty Period: 30 years from date of Substantial Completion.
 - B Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, and walkway products, for the following warranty period:
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 PVC ROOFING MEMBRANE

- A PVC Fleeceback Membrane, Type III, fabric reinforced.
 1. Manufacturers:
 - a) Carlisle Syntec, Inc.
 - b) Flex Membrane International, Inc.

c) Johns Manville International, Inc.

2. Thickness: 80 mils, nominal.

3. Exposed Face Color: White.

2.03 AUXILIARY MATERIALS

A General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as TPO sheet membrane.

C Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

D Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

E Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

F Flexible Walkways: Provide Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacture around all mech. units and leading to the roof access hatch. Basis of Design: JM PVC Walkpad , or architect approved equal.

G

2.04 SUBSTRATE BOARDS

A Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 1/4" inch thick, or per manuf req.

1. Product: Subject to compliance with requirements, provide "Dens-Deck" by Georgia-Pacific Corporation, or approved equal to match existing.

B Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening substrate panel to roof deck.

2.05 ROOF INSULATION

A General: Provide 1.5" EPS, 1.25 density roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes.

2.06 INSULATION ACCESSORIES

A General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.03 SUBSTRATE BOARD INSTALLATION

- A Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

3.04 INSULATION INSTALLATION

- A Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C Install tapered insulation under area of roofing to conform to slopes indicated.
- D Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

- F Install insulation with long joints of insulation in a continuous straight line 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.

3.05 ROOFING MEMBRANE INSTALLATION

A. Insulation and Dens Deck attachment

- 1. Carlisle Insulation and Dens Deck shall be mechanically fastened to the roof Deck as follows:
 - a. For HP Recovery Board or minimum 1-1/2" thick Polyisocyanurate, a Minimum of 5 fasteners and plates per 4' x 8' board are required.
- 2. Carlisle Piranha Plates, Seam Fastening Plates (2" diameter) or Insulation Fastening Plates(3" diameter) must be used with appropriate Carlisle.

3.06 ADHERED ROOFING MEMBRANE INSTALLATION

- A Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
 - 1. Install sheet in accordance with ASTM D 5036 and roofing system manufacturer's written instructions.
- B Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical representative.
- C Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D Bonding Adhesive: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E Urethane Membrane Adhesive: Apply 2-Part Urethane Adhesive substrate at rate required by manufacturer and install fleece-backed roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- F Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- G Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
 - 1. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.
- H Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - a) Remove and repair any unsatisfactory sections before proceeding with Work.
 3. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.
- I Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- J Proceed with installation only after unsatisfactory conditions have been corrected.

3.07 BASE FLASHING INSTALLATION

- A Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C Flash penetrations and field-formed inside and outside corners with sheet flashing.
- D Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- E Terminate and seal top of sheet flashings.

3.08 FIELD QUALITY CONTROL

- A Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.
- B Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- D Final Roof Inspection: Arrange for roofing system manufacturer's Registered Roof Observer (RRO) to inspect roofing installation on completion and submit report to Architect.
- E Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

3.09 PROTECTING AND CLEANING

- A Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

- B Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following sheet metal flashing and trim:
 - 1. Manufactured reglets.
 - 2. Formed roof drainage system.
 - 3. Formed low-slope roof flashing and trim.
 - 4. Formed wall flashing and trim.
 - 5. Formed equipment support flashing.
- B Related Sections include the following:
 - 1. Division 7 Section "Metal Wall Panels" for factory-formed metal wall panels and flashing and trim not part of sheet metal flashing and trim.
 - 2. Division 7 Section "Roofing" for installing sheet metal flashing and trim integral with roofing membrane.
 - 3. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.03 PERFORMANCE REQUIREMENTS

- A General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.04 SUBMITTALS

- A Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.

3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
4. Details of expansion-joint covers, including showing direction of expansion and contraction.

1.05 QUALITY ASSURANCE

- A Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.07 COORDINATION

- A Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.01 SHEET METALS

- A Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
 1. Mill Finish: Standard one-side bright.
- B Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
 1. Product: Subject to compliance with requirements, provide "TCS II" by Follansbee Steel.
- C Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
- D Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.02 UNDERLAYMENT MATERIALS

- A Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
- B Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

- C Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

2.03 MISCELLANEOUS MATERIALS

- A General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
 - 4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
- D Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- E Burning Rod for Lead: Same composition as lead sheet.
- F Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- G Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- H Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- I Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- J Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.04 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory- mitered and -welded corners and junctions.
 - 1. Material: Galvanized steel, 0.0217 inch (0.55 mm) thick.
 - 2. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - 3. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard

metal counterflashing or where Drawings show reglet without metal counterflashing.

4. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.05 FABRICATION, GENERAL

- A General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.
- F Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.06 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 1. Fabricate parapet scuppers from the following material:
 - a) Galvanized Steel: 0.0276 inch (0.7 mm) thick.

2.07 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.

1. Fabricate copings from the following material:
 - a) Galvanized Steel: 0.0396 inch (1.0 mm).
- B Base Flashing: Fabricate from the following material:
 1. Galvanized Steel: 0.0276 inch (0.7 mm).
- C Counterflashing: Fabricate from the following material:
 1. Galvanized Steel: 0.0217 inch (0.55 mm) thick.
- D Flashing Receivers: Fabricate from the following material:
 1. Galvanized Steel: 0.0217 inch (0.55 mm) thick.
- E Roof-Penetration Flashing: Fabricate from the following material:
 1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.
 2. Galvanized Steel: 0.0276 inch (0.7 mm) thick.
- F Roof-Drain Flashing: Fabricate from the following material:
 1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.

2.08 WALL SHEET METAL FABRICATIONS

- A Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12 foot (3.6 m) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high end dams. Fabricate from the following material:
 1. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.4 mm) thick.

2.09 MISCELLANEOUS SHEET METAL FABRICATIONS

- A Equipment Support Flashing: Fabricate from the following material:
 1. Galvanized Steel: 0.0276 inch (0.7 mm) thick.

2.10 FINISHES

- A Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
 1. Coat side of uncoated aluminum and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
- E Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.
- G Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
 1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Aluminum: Use aluminum or stainless-steel fasteners.
- H Seal joints with elastomeric sealant as required for watertight construction.
 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient

temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pretinned surface would show in finished Work.
 1. Do not solder aluminum sheet.
 2. Pretinning is not required for zinc-tin alloy-coated stainless steel and lead.
 3. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.
- J Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.03 ROOF DRAINAGE SYSTEM INSTALLATION

- A General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.

3.04 ROOF FLASHING INSTALLATION

- A General: Install sheet metal roof 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.
- B Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- C Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric sealant.
 1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.
- D Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.05 WALL FLASHING INSTALLATION

- A General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.06 MISCELLANEOUS FLASHING INSTALLATION

- A Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 CLEANING AND PROTECTION

- A Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B Clean and neutralize flux materials. Clean off excess solder and sealants.
- C Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3.
- B Related Sections include the following:
 - 1. Division 8 Section "Glazing" for glazing sealants.
 - 2. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
 - 3. Division 9 Section "Ceramic Tile" for sealing tile joints.

1.03 PERFORMANCE REQUIREMENTS

- A Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.04 SUBMITTALS

- A Product Data: For each joint-sealant product indicated.
- B Qualification Data: For Installer.

1.05 QUALITY ASSURANCE

- A Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 PROJECT CONDITIONS

- A Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.07 WARRANTY

- A Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- B Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Ten years from date of Substantial Completion.
- C Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A Basis of Design Product: The design is based upon Dow Corning products or comparable manufacturer and product.

2.02 MATERIALS, GENERAL

- A Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

2.03 ELASTOMERIC JOINT SEALANTS

- A Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

2.04 ACOUSTICAL JOINT SEALANTS

- A Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
 1. Products:

- a) Pecora Corporation; BA-98.
- b) Tremco; Tremco Acoustical Sealant.

2.05 JOINT-SEALANT BACKING

- A General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

2.06 MISCELLANEOUS MATERIALS

- A Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a) Concrete.

- b) Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a) Metal.
 - b) Glass.
 - c) Prefinished architectural panels,
- B Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.04 CLEANING

- A Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

- A Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.06 JOINT-SEALANT SCHEDULE

- A Joint-Sealant Application JS-#1: Exterior vertical and horizontal nontraffic construction joints in cast-in-place concrete.
 1. Joint Sealant: Dow Corning, #756
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- B Joint-Sealant Application JS-2#: Exterior butt joints between metal panels.
 1. Joint Sealant: Dow Corning, #791 or 795.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- C Joint-Sealant Application JS-3#: Exterior vertical joints between different materials.
 1. Joint Sealant: Dow Corning, #756 or 790.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- D Joint-Sealant Application JS-4#: Exterior perimeter joints between adjacent walls and frames of doors windows and louvers.
 1. Joint Sealant: Dow Corning, #756.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- E Joint-Sealant Application JS-#5: Interior perimeter joints of exterior openings.
 1. Joint Sealant: Latex sealant.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- F Joint-Sealant Application JS-#6: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
 1. Joint Sealant: Latex sealant.
 2. Joint-Sealant Color: White.
- G Joint-Sealant Application JS-#7: Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 1. Joint Sealant: Dow Corning, #786.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range .

END OF SECTION

SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Steel doors.
 - 2. Steel door frames.
- B Related Sections include the following:
 - 1. Division 8 Section "Door Hardware".
 - 2. Division 9 Section "Gypsum Board Assemblies".
 - 3. Division 9 Section "Painting".

1.03 DEFINITIONS

- A Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.04 SUBMITTALS

- A Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B Shop Drawings: Show the following:
 - 1. Elevations of each door design.
 - 2. Details of doors including vertical and horizontal edge details.
 - 3. Frame details for each frame type including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, accessories, joints, and connections.
- C Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.05 QUALITY ASSURANCE

- A Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

- B Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Doors and Frames: Ceco Door Products; a United Dominion Company.

2.02 MATERIALS

- A Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- C Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.
- D Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.03 DOORS

- A General: Provide doors of sizes, thicknesses, and designs indicated.
- B Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

2.04 FRAMES

- A General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B Frames of 0.053-inch- (1.3-mm-) thick steel sheet for:
 - 1. Door openings wider than 48 inches (1220 mm).
 - 2. Wood doors, unless otherwise indicated.

- C Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- D Supports and Anchors: Fabricated from not less than 0.042-inch- (1.0-mm-) thick, electrolytic zinc-coated or metallic-coated steel sheet.
- E Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.05 FABRICATION

- A General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, 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.
- B Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- (1.3-mm-) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
- D Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom.
- E Single-Acting, Door-Edge Profile: Square edge.
- F Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- G Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- H Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- I Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
 - 1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.
- J Frame Construction: Fabricate frames to shape shown.
 - 1. For exterior applications, fabricate frames with mitered or coped and continuously welded corners.
 - 2. Provide welded frames with temporary spreader bars.

- K Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- L Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

2.06 FINISHES

- A Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.01 INSTALLATION

- A General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. 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.
 - 1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
 - 2. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
 - 3. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
 - 4. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.
- C Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
 - 1. Smoke-Control Doors: Install to comply with NFPA 105.

3.02 ADJUSTING AND CLEANING

- A Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.
- B Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 08 14 16 – FLUSH WOOD DOORS

PART I – GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. Work under this section comprises of furnishing solid core doors with wood veneer faces, light frames, factory fitting and machining and factory finishing for fire labeled and non labeled flush wood doors.

B. RELATED DOCUMENTS

1. Related documents, drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 specification sections apply to this section.

C. RELATED SECTIONS

1. 08110 – Metal Doors and Frames

1.02 REFERENCES

A. STANDARDS

1. NFPA-80 – Fire Doors and Windows
2. NFPA-105 – Recommend Practice for Installation of Smoke Controlled Door Assemblies
3. WDMA I.S. 1A – Wood Door Manufacturer's Association, Flush Wood Door Performance Standards
4. UL10C - Standard for Positive Pressure Fire Tests of Door Assemblies

B. CODES

1. NFPA-101 – Life Safety Code
2. IBC 2003 – International Building Code

3. ANSI-A117.1 – Accessible and Usable Buildings and Facilities.
4. ADA – Americans with Disabilities Act

1.03 SUBMITTALS

A. GENERAL REQUIREMENTS

1. Submit copies of the hollow metal door and frame shop drawings in accordance with Division 1, General Requirements.

B. PRODUCT DATA

1. Submit shop drawings showing fabrication and installation of flush wood doors. Include details of door elevations, details of construction, location and installation requirements of door hardware.

C. SHOP DRAWINGS

1. Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents. Shop drawings should include the following information:
 - a. Door core material.
 - b. Mortises and reinforcements.
 - c. Glazed and louvered openings and material.
 - d. Mounting locations of standard hardware.

D. SAMPLES

1. Upon request submit the following samples:
 - a. Corner sections of doors approximately 8" x 10" with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required.
 - b. Finish sample with same materials proposed for site-finished doors or manufacturer's prefinished samples for factory-finished doors.

- c. Frames for light openings, 6" long, for each material, type, and finish required.

1.04 QUALITY ASSURANCE

A. SUBSTITUTIONS

- 1. All substitution requests must be submitted within the procedures and time frame as outlined in Division 1, General Requirements. Approval of products is at the discretion of the architect and his consultant.

B. MANUFACTURER QUALIFICATIONS

- 1. Manufacturer shall be a member in good standing of the Wood Door Manufacturer's Association (WDMA).
- 2. Obtain wood doors from a single manufacturer to ensure uniformity in quality of appearance and construction. All material supplied for this project to conform to WDMA I.S. 1A-97 for premium grade wood doors.

C. FIRE RATED DOORS

- 1. Project requires door assemblies and components that are compliant with positive pressure and S-label requirements. Specifications must be cross-referenced and coordinated with hardware and other door manufacturers to ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
 - a. Certification(s) of compliance shall be made available upon request by the Authority Having Jurisdiction.
- 2. A physical label to be permanently affixed to the fire door at an authorized facility. Furthermore, all 45, 60, and 90 minute label fire doors are to have manufacturer's standard laminated stiles for improved screw holding and split resistance capability.
 - a. At stairwell enclosures, provide doors that have a temperature-rise rating of 450-degree F maximum in 30 minutes of fire exposure.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Doors are to be shipped from manufacturer in individual polybags, and shall be inspected immediately upon arrival at jobsite for any damage or defects.

- B. Identify each door with individual opening numbers that correlate with designation system used on shop drawings and contract drawings for door, frames and hardware. Use only temporary, removable, or concealed markings.
- C. Do not deliver or install doors until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy level in storage and installation areas.

1.06 WARRANTY

- A. Warranties shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
- B. Submit written warranty on manufacturer's standard form signed by the manufacturer agreeing to replace or repair defective doors which have:
 - 1. Delamination in any degree.
 - 2. Warp or twist of 1/4" or more in any 3' x 6" x 7' plane of door face.
 - 3. Telegraphing of stile, rail or core through face to cause surface variation in excess of 1/100" in any 3" spans.
- C. Contractor shall replace or refinish doors where contractor's work contributed to rejection or voiding of manufacturer's warranty.
- D. Solid core interior doors shall be warranted for the life of their installation.

PART II - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide flush wood doors by one of the manufacturers as listed.

2.02 DOORS

A. GENERAL REQUIREMENTS

- 1. Doors shall have premium grade A faces with manufacturer's standard five (5) ply construction; minimum 1/8" thick.
- 2. Faces shall be minimum 1/50" at 12% moisture content thick after finish sanding.
 - a. Veneer Cut: Plain Sliced
 - b. Face Assembly: Book Match, Running Match

- c. Stain Color: As selected by Manufacturer's Full Range.
- d. Veneer Species: Select White Birch
- 3. Doors shall have minimum 1" stiles on the hinge stile and 13/16" minimum on the lock stile; both stiles faces shall match the door veneer. Top and bottom rails shall be a minimum 13/16"; rails shall be mill option hardwood or structural composite lumber (SCL).
- 4. All fire rated doors shall be supplied to meet UL10C positive pressure standards for category "A" doors. All required intumescent seals shall be concealed into the edge of the door; frame applied intumescent seals are not acceptable.
- 5. All fire rated doors shall be supplied to meet UL10C positive pressure standards for category "B" doors. All required intumescent seals shall be supplied as specified in section 08 71 00 – Door Hardware.

B. NON RATED AND 20 MINUTE DOORS

- 1. Supply particleboard core complying with WDMA I.S. 1A and ANSI-A208.1, Grade 1-LD, bonded to the door faces, stiles and rails using a Type I adhesive. Components are to be assembled to meet or exceed 20 minute fire door specifications for UL10C fire test requirements.
 - a. Algoma: Super Novodor / FD 1/3
 - b. Eggers: PC5 / PC5-20
 - c. Graham: GPD PC5 / GPD PC5-20
 - d. Marshfield: DPC-1 / DFP-20
 - e. VT Industries: 5502
- 2. Supply engineered core complying with WDMA I.S. 1A, bonded to door faces, stiles and rails using a Type I adhesive. Components are to be assembled to meet or exceed 20 minute fire door specifications for UL10c fire test requirements. Door shall meet or exceed WDMA I.S. 1A Extra Heavy Duty performance standards.
 - a. Algoma: FGFW
 - b. Eggers: SCL5 / SCL5-20
 - c. Graham: GPD EC5 / GPD EC5-20
 - d. Marshfield: DCL-1 / DCL-20
 - e. VT Industries: 5508

3. Provide LSL Timberstrand blocking at particleboard-core doors as follows to preclude the use of thru-bolts:
 - a. Provide 5" top-rail blocking, at doors indicated to have closers.
 - b. Provide 5" mid-rail blocking, at doors indicated to have exit devices.

C. FIRE RATED DOORS OVER 20 MINUTES

1. Supply fire resistive composite mineral core construction to provide the fire rating indicated, boned to door faces, stiles and rails using a Type I adhesive. Components are to be assembled to meet or exceed fire door specifications for UL10C fire test requirements.
 - a. Algoma: FD
 - b. Eggers: FGP
 - c. Graham: GPD FD5
 - d. Marshfield: DFM
 - e. VT Industries: 5545/5511
2. For mineral-core doors, provide composite blocking with improved screw holding capability approved for use in doors of fire ratings indicated as necessary to eliminate need for through-bolting hardware and as follows:
 - a. Provide 5" top-rail blocking.
 - b. Provide 4 1/2" x 10" lock blocks.
 - c. Provide 5" mid-rail blocking, at doors indicated to have exit devices.
3. At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.

2.03 FACTORY FINISHING

- A. Prefinish all wood doors at the factory with a clear sealant; no stain is required.
- B. Prefinish all wood doors per WDMA I.S. 1A, Section G-15, Factory Finishing for Premium Grade factory finish systems.
- C. Finish doors using three (3) coats of water-clear 100% solids, modified acrylic urethane, cured immediately with ultra-violet light.
- D. Factory seal doors on all six (6) sides using manufacturer's standard meeting these applications.

2.04 FIELD FINISHING

- A. Field Finish wood doors in accordance with Division 9, Painting.

2.05 LIGHT FRAMES

- A. Provide wood frames for light openings as follows:
 - 1. Wood Species: Same species as door faces.
 - 2. Profile: Manufacturer's standard shape.
 - 3. Frames for Openings in Fire Doors: Wood frames and metal glazing clips approved for use in 20-minute fire-rated wood-core doors.
- B. Provide manufacturer's standard wood veneered beads for fire doors that are approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.
- C. Provide manufacturer's standard metal light frame formed of 18-gauge, cold-rolled steel sheet, factory primed and approved for use in doors of fire rating indicated.

2.06 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
 - 1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.
- B. 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 factory machining.
 - 2. Premachine metal astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 - 1. Trim openings with moldings of material and profile indicated.

PART III - EXECUTION

3.01 EXAMINATION

- A. Examine installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. For hardware installation, see Division 8 Section "Door Hardware."
- B. Install wood doors to comply with manufacturer's written instructions, referenced quality standard and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Align factory fitted doors in frames for uniform clearance at each edge.

3.03 ADJUSTING AND PROTECTING

- A. Rehang or replace doors that do not swing or operate freely.
- B. Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1- GENERAL

A. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. SUMMARY

1. Section Includes:
 - A. Counter doors.
2. Related Sections:
 - A. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.

C. PERFORMANCE REQUIREMENTS

1. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

D. SUBMITTALS

1. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - A. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - B. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
2. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

E. QUALITY ASSURANCE

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
2. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
 - A. Obtain operators and controls from overhead coiling door manufacturer.

PART 2 – PRODUCTS

B. DOOR CURTAIN MATERIALS AND CONSTRUCTION

1. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1 Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm) and as required to meet requirements.
 - 2 Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of 0.025 inch (0.64 mm) and as required to meet requirements.
 - 3 Gasket Seal: Provide insulated slats with manufacturer's standard interior-to-exterior thermal break or with continuous gaskets between slats.
2. Endlocks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
3. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
4. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
5. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.
 - 1 Removable Posts and Jamb Guides for Counter Doors: Manufacturer's standard.

B. COUNTER DOORS

1. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:
 - 1 Galvanized Steel: Nominal 0.064-inch thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
 - 2 Stainless Steel: 0.062-inch thick stainless-steel sheet, Type 304, complying with ASTM A 666.

C. LOCKING DEVICES

1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

D. CURTAIN ACCESSORIES

1. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- 1 Provide pull-down straps or pole hooks for doors more than 84 inches (2130 mm) high.

E. COUNTERBALANCING MECHANISM

1. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
2. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.
3. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
4. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
5. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

F. MANUAL DOOR OPERATORS

1. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
2. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25 lbf force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

G. DOOR ASSEMBLY

1. Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.

- 1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]
 - 1 Cookson Company.
 - 2 Overhead Door Corporation.
2. Operation Cycles: Not less than 20,000.
3. Door Curtain Material: Galvanized steel; Stainless steel at kitchen location.
4. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.
5. Curtain Jamb Guides: Galvanized steel, Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
6. Integral Frame, Hood, and Fascia for Counter Door: Galvanized steel, Stainless steel.
 - 1 Mounting: Face of wall
7. Sill Configuration for Counter Door: No sill, closes on counter top.
8. Locking Devices: Equip door with slide bolt for padlock.
9. Manual Door Operator: Manufacturer's standard crank operator.
 - 1 Provide operator with through-wall shaft operation.
 - 2 Provide operator with manufacturer's standard removable operating arm.
10. Door Finish:
 - 1 Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

H. GENERAL FINISH REQUIREMENTS

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

I. STEEL AND GALVANIZED-STEEL FINISHES

1. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness. For exact finish, insert names of coating manufacturers and products.

PART 3 - EXECUTION

A. EXAMINATION

1. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
2. Examine locations of electrical connections.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. INSTALLATION

1. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
2. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
3. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
4. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

C. STARTUP SERVICE

1. Engage a factory-authorized service representative to perform startup service.
- 1 Perform installation and startup checks according to manufacturer's written instructions.
- 2 Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. ADJUSTING

1. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
2. Lubricate bearings and sliding parts as recommended by manufacturer.

E. DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 08 36 10 - SECTIONAL OVERHEAD DOORS

PART 1- GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Division 16 Sections for electrical service and connections for powered operators and accessories.

1.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
- D. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.
- E. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- F. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
- G. Seismic Component Importance Factor: 1.0.
- H. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.03 SUBMITTALS

1. Product Data: For each type and size of sectional door and accessory. Include the following:

- 1 Construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.

- 2 Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
2. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1 Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2 Wiring Diagrams: For power, signal, and control wiring.
3. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1 Include similar Samples of accessories involving color selection.
4. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1 Detail fabrication and assembly of seismic restraints.
 - 2 Summary of forces and loads on walls and jambs.
5. Seismic Qualification Certificates: For sectional doors, accessories, and components, from manufacturer.
6. Warranties: Sample of special warranties.

1.04 QUALITY ASSURANCE

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
2. Source Limitations: Obtain sectional doors from single source from single manufacturer.
 - 1 Obtain operators and controls from sectional door manufacturer.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

1.05 WARRANTY

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
 - 1 Failures include, but are not limited to, the following:

- 1 Structural failures including, but not limited to, excessive deflection.
- 2 Faulty operation of hardware.
- 3 Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
- 4 Delamination of exterior or interior facing materials.
- 5 Warranty Period: Five years from date of Substantial Completion.

PART 2- PRODUCTS

2.01 STEEL DOOR SECTIONS

1. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
 - 1 Fabricate section faces from single sheets to provide sections not more than 24 inches (610 mm) high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
2. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch- (1.63-mm-) nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch- (1.63-mm-) thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
3. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal.
4. Provide reinforcement for hardware attachment.
5. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.02 TRACKS, SUPPORTS, AND ACCESSORIES

1. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
2. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

- 1 Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets.
 - 2 Sloped Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.
3. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.
4. Windows: Window units of type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors and elastic glazing compound for wood doors, as required.

2.03 HARDWARE

1. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
2. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- (2.01-mm-) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 16 feet (4.88 m) wide unless otherwise recommended by door manufacturer.
3. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.

2.04 LOCKING DEVICES

1. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.05 COUNTERBALANCE MECHANISM

1. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
2. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 feet (4.88 m) long unless closer spacing is recommended by door manufacturer.
3. Cables: Galvanized-steel lifting cables with cable safety factor of at least 5 to 1.

4. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.
5. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
6. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.06 ELECTRIC DOOR OPERATORS

1. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

- 1 Comply with NFPA 70.
- 2 Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

2. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

3. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

- 1 Jackshaft, Center Mounted: Jackshaft operator mounted on the inside front wall above door and connected to torsion shaft with an adjustable coupling or drive chain.
- 2 Electrical Characteristics:
 - A. Phase: Single phase.
 - B. Volts: 208 V.
 - C. Hertz: 60.
- 3 Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
- 4 Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
- 5 Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- 6 Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- 7 Use adjustable motor-mounting bases for belt-driven operators.

4. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

5. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

- 1 Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

6. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

- 1 Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

7. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

8. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

9. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

10. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

2.07 DOOR ASSEMBLY

1. Steel Sectional Door: Sectional door formed with hinged sections.

- 1 Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. Overhead Door Corporation.
 - b. R & S Door

2. Operation Cycles: Not less than 20,000.

3. Installed R-Value: 6.0 deg F x h x sq. ft./Btu.

4. Steel Sections: Zinc-coated (galvanized) steel sheet with zinc coating.

Section Thickness: 1-3/4 inches (44 mm).

Exterior-Face, Steel Sheet Thickness: 0.028-inch- (0.71-mm-) nominal coated thickness.

Surface: Flat.

Surface: Manufacturer's standard,].

5. Track Configuration: High-lift track. Weatherseals: Fitted to bottom and top and around entire perimeter of door.

6. Windows: With with square corners, and spaced apart the approximate distance as indicated on Drawings; in one row at height indicated on Drawings; installed with insulated glazing of the following type:

- 1 Clear Float Glass: 3 mm thick (each pane) and complying with ASTM C 1036, Type I, Class 1, Quality Q3.

7. Roller-Tire Material: Case-hardened steel.

8. Counterbalance Type: Torsion spring.

9. Electric Door Operator:

- 1 Usage Classification: Heavy duty, 60 to 90 cycles per hour.
- 2 Operator Type: As indicated.
- 3 Motor Exposure: Exterior, dusty, wet, or humid.
- 4 Remote-Control Station: Exterior.
- 5 Other Equipment: Audible and visual signals, Radio-control system.

10. Door Finish:

- 1 Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
- 2 Finish of Interior Facing Material: Match finish of exterior section face.

2.08 GENERAL FINISH REQUIREMENTS

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.09 STEEL AND GALVANIZED-STEEL FINISHES

1. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

A. EXAMINATION

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
2. Examine locations of electrical connections.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. INSTALLATION

1. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
2. Tracks:
 - a. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches (610 mm) apart.
 - b. Hang track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
 - c. Repair galvanized coating on tracks according to ASTM A 780.
 - d. Track shall follow the slope of the ceiling plane.
3. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

C. STARTUP SERVICES

1. Engage a factory-authorized service representative to perform startup service.
2. Complete installation and startup checks according to manufacturer's written instructions.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. ADJUSTING

1. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
2. Lubricate bearings and sliding parts as recommended by manufacturer.
3. Adjust doors and seals to provide weathertight fit around entire perimeter.
4. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.
5. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

E. DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION

SECTION 08 41 10 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A This Section includes the following:
 - 1. Exterior aluminum-framed storefronts.
 - a) Glazing is retained mechanically with gaskets on four sides.
 - 2. Exterior manual-swing aluminum doors.
- B Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 - 2. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
 - 3. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.03 PERFORMANCE REQUIREMENTS

- A General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 4. Dimensional tolerances of building frame and other adjacent construction.
 - 5. Failure includes the following:
 - a) Deflection exceeding specified limits.
 - b) Thermal stresses transferred to building structure.
 - c) Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d) Noise or vibration created by wind and thermal and structural movements.
 - e) Loosening or weakening of fasteners, attachments, and other components.
 - f) Sealant failure.
 - g) Failure of operating units to function properly.

1.04 SUBMITTALS

- A Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
 2. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- C Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.
- D Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.05 QUALITY ASSURANCE

- A Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- B Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- C Accessible Entrances: Comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1.06 PROJECT CONDITIONS

- A Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS: Subject to compliance with requirements, provide products by the following or approved equivalent:

1. Kawneer.
2. United States Aluminum.
3. Vistawall Architectural Products.

2.02 MATERIALS

- A Kawner, "Trifab 601", 2"x6", center glass plane.
- B Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

2.03 FRAMING SYSTEMS

- A Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- B Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - 2. Reinforce members as required to receive fastener threads.
- D Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- E Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.04 GLAZING SYSTEMS

- A Glazing: As specified in Division 8 Section "Glazing."
- B Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
- C Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

2.05 DOORS

- A Doors: Manufacturer's standard glazed doors, for manual swing operation.
 - 1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: Wide stile; 5-inch (127-mm) nominal width.
 - a) Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
 - 3. Glazing Stops and Gaskets: Beveled or Square, snap-on, extruded-aluminum stops and preformed gaskets.
- B Door Hardware: As specified in Division 8 Section "Door Hardware."

2.06 ACCESSORY MATERIALS

- A Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."
- B Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.07 FABRICATION

- A Form aluminum shapes before finishing.
- B Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from exterior.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).
- D Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
- E Doors: Reinforce doors as required for installing hardware.
 - 1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- F Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.
- G After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.08 ALUMINUM FINISHES

- A General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C Finnish: Class II, Color Anodic Finish: AA-M12C22A41, color – As selected from Manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight, unless otherwise indicated.
- B Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
- E Install components plumb and true in alignment with established lines and grades, without warp or rack.
- F Install glazing as specified in Division 8 Section "Glazing."
- G Entrances: Install to produce smooth operation and tight fit at contact points.
 - 1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
 - 2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
- I Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
 - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
 - 2. Alignment:
 - a) Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
 - b) Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
 - 3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch (3 mm).

3.03 FIELD QUALITY CONTROL

- A Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 - 1. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- D Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.04 ADJUSTING

- A Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
 - 1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch measured to the leading door edge.

END OF SECTION

SECTION 08 71 00 - FINISH HARDWARE

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: Finish hardware except as otherwise specified or specifically omitted herein.
- B. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Windows
 - 2. Cabinets of all kinds, including open wall shelving and locks.
 - 3. Toilet accessories of all kinds including grab bars.
 - 4. Folding partitions, except cylinders where detailed.

1.02 SUBSTITUTIONS & SUBMITTALS:

- A. Requests for substitutions must be made in writing 10 days prior to bid date to allow architect to issue an addendum. If proposing a substitute, submit that product data attached to one showing specified item and indicate savings to be made. No other substitutions will be allowed.
 - 1. Items listed with no substitute manufactures have been requested by Owner to match existing.
- B. SUBMITTALS: Submit six copies of schedule at earliest possible date prior to delivery of hardware. Organize schedule into "Hardware Sets" with an index of doors and heading, indicating complete designations of every item required for each door or opening. Include the following information:
 - 1. Type, style, function, size, quantity and finish of each hardware item.
 - 2. Name, part number and manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of hardware set cross referenced to indications on drawings both on floor plans and in door schedule.
 - 5. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 6. Mounting locations for hardware.
 - 7. Door and frame sizes and materials.
 - 8. Submit manufacture's technical data and installation instructions for the electronic hardware.
 - 9. Catalog cuts.
- C. Templates: Where required, furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.

1.03 QUALITY ASSURANCE:

- A. Qualifications:
 - 1. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from only one manufacturer, although several may be indicated as offering products complying with requirements.

2. Hardware supplier shall be a direct factory contract supplier who has in his employment a certified architectural hardware consultant (AHC) who is available at all reasonable times during the course of the Work, and for project hardware consultation to the Owner, Architect, and Contractor.
- B. Schedule Designations: Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply that another manufacturer's products will not be acceptable, unless they are not equal in design, size, weight, finish function, or other quality of significance. See 1.02 A for substitutions.
- C. Exit Doors: Openable at all times from the inside without the use of a key or any special knowledge or effort.
- D. Fire-rated openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80. This requirement takes precedence over other requirements for such hardware. Provide only such hardware which has been tested and listed by UL for the type and size of door required, and complies with the requirements of the door and the door frame labels. Latching hardware, door closers, ball bearing hinges, and seals are required whether or not listed in the Hardware schedule.
 1. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label on exit device indicating "Fire Exit Hardware."

1.04 DELIVERY, STORAGE, AND HANDLING:

- A. Acceptance at the Site: Individually package each unit of finish hardware complete with proper fastening and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.
- B. Deliver packaged hardware items at the times and to the locations (shop or field) for installation, as directed by the Contractor.

1.05 PROJECT CONDITIONS:

- A. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Upon request, check the Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.06 WARRANTY:

- A. Provide guarantee from hardware supplier as follows:
 1. Closers: Ten years: except electronic closers: Two years.
 2. Exit Devices & Locksets: Three years
 3. All other Hardware: Two years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. See Drawings for Approved manufacturers.
- B. Furnish all items of hardware required to complete the work in accordance with specifications and plans.
- C. Carefully inspect Project for the extent of the finish hardware required to complete the Work. Where there is a conflict between these Specification and the existing hardware furnish finish hardware to specification.

2.02 MATERIALS:

- A. Exterior: Mortise type Locks and Latches shall be heavy-duty with hinged, anti-friction, 3/4 inch throw latchbolt with anti-friction piece made of self lubricating stainless steel. Functions and design as indicated on the hardware groups. Deadbolt functions shall be 1 inch projection made of hardened stainless steel. both deadbolt and latchbolt are to extend into the case a minimum of 3/8 inch when fully extended. Furnish locksets and latchsets with sufficient curved strike lip to protect door trim. Provide locksets with 7-pin interchangeable core cylinders. All mortise cylinders shall have a concealed internal set screw for securing the cylinder to the lockset. The internal set screw will be accessible only by removing the core from the cylinder body. Locksets and latchsets to have self-aligning, thru-bolted trim. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated. Lever handles must be of forged or cast brass, bronze or stainless steel construction. Levers which contain a hollow cavity are not acceptable. Spindle to be such that if forced it will twist first, then break, thus preventing forced entry. Levers to be operated with a roller bearing spindle hub mechanism.

Interior: All locksets and latchsets shall be extra-heavy-duty lever cylindrical with Best 7-pin interchangeable core. Lockset and Cores to be of the same manufacturer to maintain complete lockset warranty. Locks to have solid shank with no opening for access to keyed lever keeper. Keyed Lever to be protected by means of a break-away mechanism to prevent forced entry, when excessive torque is applied, a replaceable part will shear. Lock chassis must be through-bolted (outside of the lock chassis prep) to prevent rotation of chassis after installation. Lock manufacturer shall provide a three-year warranty, in writing, to the Owner, along with three copies of the lock service manual. Strikes shall be 16 gauge curved brass, bronze or stainless steel with a 1" deep box construction, and have sufficient length to clear trim and protect clothing.

- 1. Grade 1 Cylindrical Locks shall have minimum 9/16 throw. All deadbolts shall have 1-inch minimum throw.
 - 2. Comply with requirements of local security ordinances.
 - 3. Lock Series and Design: Best 35H7 15H Trim and 93K7 15D Trim.
Cylinders: Best 7-Pin
- B. Hinges: Outswinging exterior doors shall have non removable pin hinges. All hinge open widths shall be minimum, but of sufficient size to permit door to swing 180. Furnish hinges with five knuckles and flush bearing.
 - 1. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
 - 2. Provide hinges as listed in schedule.
- C. Exit Devices: Furnish all sets at wood doors with sex bolts unless otherwise specified. Lever handle trim shall match locksets. All touch bar type devices shall have deadlocking latchbolt, stainless steel touchpads or vinyl covered pads and be non-handed. The unlatching force shall not exceed 15 pounds when applied in the direction of exit travel.

- D. Surface Door Closers: Full rack and pinion type with removable non-ferrous cover. Provide sex bolts at all wood doors. Place closers inside building, stairs, and rooms. Closers shall be non-handed, non-sized and adjustable.
 - 1. Provide multi-size 1 through 6 at all doors rated or not.
 - 2. Flush transom offset brackets shall be used where parallel arm closers are listed for doors with fixed panels over.
 - 3. Drop brackets are required at narrow head rails.
 - 4. Set exterior doors closers to have 8.5 lbs maximum pressure to open, interior non-rated at 5 lbs, rated openings at 12 lbs.
- E. Kickplates: Provide with four beveled edges, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish screws to match finish.
- F. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.
- G. Screws: All exposed screws shall be Phillips head.
- H. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.

2.03 FINISH:

- A. Generally to be BHMA 626 Satin Chrome.
 - 1. Protection Plates, Push, Pulls shall be BHMA 630.
- B. Spray door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.04 KEYING REQUIREMENTS:

- A. Provide construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished on the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner (by the local Best factory representative) prior to occupancy.
- B. All cylinders shall be Best 7-pin, interchangeable core.
- C. Permanent keys and cores shall be stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Locksets and cylinders will be keyed, master keyed, and grand master keyed into the Owner's system. Keying will be performed by Owner.
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Best Access Systems Factory Representative. All Construction cores and keys remain the property of Best Access Systems.

- G. Keying schedule: Submit three copies of separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

PART 3 - EXECUTION

3.01 HARDWARE LOCATIONS:

- A. Hinges:
 - 1. Bottom Hinge: 10 inches from door bottom to bottom of hinge.
 - 2. Top Hinge: 5 inches from door top to top of hinge.
 - 3. Center Hinge: Center between top and bottom hinge.
 - 4. Extra Hinge: 6 inches from bottom of top hinge to top of extra hinge.
- B. Lock: 38 inches from finished floor to center of lever or knob.
- C. Push Bar: 44 inches from bottom of door to center of bar.
- D. Push Plate: 44 inches from bottom of door to center of plate.
- E. Pull Plate: 42 inches from bottom of door to center of pull.
- F. Exit Device: 39-13/16 inches from finished floor to center of pad.
- G. Deadlock Strike: 44 inches from floor, centered.

3.02 INSTALLATION:

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Installation shall conform to local governing agency security ordinance.

3.03 ADJUSTING:

- 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.
- B. Inspection: Hardware supplier shall inspect all hardware furnished within 10 days of contractor's request and include with his guarantee a statement that this has been accomplished. Inspector or Contractor shall sign off the hardware as being complete and correctly installed and adjusted. Further corrections of defective material shall be the responsibility of his representative.

3.04 SCHEDULE OF FINISH HARDWARE:

- A. Schedule of Finish Hardware on the Drawings indicates which Hardware Set is used with door.

END OF SECTION.

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows and sidelites.
 - 2. Doors.
 - 3. Glazed entrances.
 - 4. Storefront framing.
 - 5. Curtain wall
- B. Related Sections include the following:
 - 1. Division 8 Section "Aluminum-Framed Entrances and Storefronts."

1.03 DEFINITIONS

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass.
 - 1. Each color of tinted float glass.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who

employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- D. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
 - 2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped Glazing Guidelines."
- F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.
 - 3. National Accreditation and Management Institute.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.09 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and

shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units that deteriorate within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated in schedules at the end of Part 3.

2.02 WIRED GLASS

- A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:
 - 1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:
 - a) Mesh m2 (square).

2.03 INSULATING GLASS

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
 - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - 1. Manufacturer's standard sealants.
- D. Spacer Specifications: Manufacturer's standard spacer material and construction.
- E. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - 1. Aluminum with mill or clear-anodized finish.
 - 2. Corner Construction: Manufacturer's standard corner construction.

2.04 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. Neoprene, ASTM C 864.
 - 2. EPDM, ASTM C 864.
 - 3. Silicone, ASTM C 1115.
 - 4. Thermoplastic polyolefin rubber, ASTM C 1115.
 - 5. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
 - 1. Neoprene.
 - 2. EPDM.
 - 3. Silicone.
 - 4. Thermoplastic polyolefin rubber.
 - 5. Any material indicated above.

2.05 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.06 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) as follows:
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.05 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.06 MONOLITHIC FLOAT-GLASS SCHEDULE

- A. Uncoated Clear Float Glass: Where glass as designated below is indicated, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:
 - 1. Uncoated Clear Fully Tempered Float Glass: Kind FT (fully tempered).

- B. Coated Tinted Float Glass: Where glass as designated below is indicated, provide Class 2 (tinted, heat-absorbing, and light-reducing) glass lites complying with the following:
 - 1. Tint Color: "Caribia" by PPG.
 - 2. Coated Tinted Fully Tempered Float Glass: Kind FT (fully tempered).
- C. Low-E Coated Float Glass: Where glass as designated below is indicated, provide Class 2 (heat-absorbing, and light-reducing) glass lites complying with the following:
 - 1. Low-E coated Fully Tempered Float Glass: Kind FT (fully tempered).

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum wallboard.
 - 2. Tile backing panels.

1.03 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.05 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."
- B. Gypsum Board Finish Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Install mockups for the following applications:
 - a) Surfaces indicated to receive textured paint finishes.
 - 2. Simulate finished lighting conditions for review of mockups.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.01 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Gypsum Wallboard: ASTM C 36.
 - 1. Type X (where indicated):
 - a) Thickness: 5/8 inch (15.9 mm).
 - b) Long Edges: Tapered.
 - c) Location: As indicated .

2.02 RESTROOMS, JANITORIAL, STORAGE AREAS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M.
 - 1. Core: 5/8 inch (15.9 mm), regular type.
- C. Cementitious backer board for tile locations, Denshield or approved equal. "Greenboard" is not acceptable at tile installations.

2.03 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet].
 - 2. Shapes:
 - a) Cornerbead: Use at outside corners.
 - b) L-Bead: L-shaped; exposed long leg receives joint compound; use where indicated.

2.04 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a) Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

- D. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.

2.05 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Contractor shall float, patch, repair, or skim existing wall surfaces as required, in order to achieve an acceptable wall substrate for the application of a new wall finish.

3.02 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- F. Attach gypsum panels to framing provided at openings and cutouts.
- G. Form control and expansion joints with space between edges of adjoining gypsum panels.
- H. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect open concrete coffer, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffer, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- I. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- J. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.
- K. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

3.03 PANEL APPLICATION METHODS

- A. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a) Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b) At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
- B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Tile Backing Panels:
1. Water-Resistant Gypsum Backing Board: Install at showers, toilet, and locker rooms, and where indicated. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
 2. Areas Not Subject to Wetting: Install standard gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
 3. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.04 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

3.05 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Contractor shall install a new "orange peel" wall finish texture over the existing wall texture at all existing wall locations.
- E. Contractor shall float, patch, repair, or skim existing wall surfaces as required, in order to achieve an acceptable wall substrate for the application of a new wall finish.
- F. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 - 2. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

END OF SECTION

SECTION 09 30 00 - CERAMIC TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Glazed porcelain floor tile.
 - 2. Glazed wall tile.
 - 3. Metal edge strips installed as part of tile installations.

1.03 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6 wet.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Full-size units of each type of trim and accessory.
 - 3. Metal edge strips in 6-inch (150-mm) lengths.

1.05 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all from one source or producer.
 - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
 - 1. Joint sealants.
 - 2. Metal edge strips.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.08 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. 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 indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
 - 2. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.02 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
 - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.03 TILE PRODUCTS

- A. Manufacturers: Dal-Tile International Corp. or as indicated.

- B. Unglazed Ceramic Floor Tile (restrooms): As indicated on Drawings, color to be selected by Architect from manufacturer's full range of colors.
- C. Glazed Wall Tile: "As indicated on Drawings, color to be selected by Architect from manufacturer's full range of colors.
- D. Glazed Ceramic Floor Tile: As indicated on Drawings, color to be selected by Architect from manufacturer's full range of colors.
- E. Glazed Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:
 - 1. Base for Thin-Set Mortar Installations: Restroom locations shall have a coved base.
 - 2. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size to match wall tile.
 - 3. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above.
 - 4. External Corners for Thin-Set Mortar Installations: Surface bullnose.
 - 5. Internal Corners: Field-buttet square corners except with coved base and cap angle pieces designed to fit with stretcher shapes.

2.04 SETTING AND GROUTING MATERIALS

- A. Available Manufacturers:
 - 1. Custom Building Products.
 - 2. DAP, Inc.
 - 3. LATICRETE International Inc.
 - 4. MAPEI Corporation.
- B. Organic Adhesive: ANSI A136.1, Type I.
- C. Standard Sanded Cement Grout: ANSI A118.6, color as indicated.

2.05 ELASTOMERIC SEALANTS

- A. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- B. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
 - 1. Available Products:
 - a) Dow Corning Corporation; Dow Corning 786.
 - b) GE Silicones; Sanitary 1700.
 - c) Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - d) Tremco, Inc.; Tremsil 600 White.

2.06 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
 - 1. Available Products:
 - a) Bonsal, W. R., Company; Grout Sealer.
 - b) Bostik; CeramaSeal Grout Sealer.
 - c) Custom Building Products; Surfaceguard Grout Sealer.
 - d) MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - e) Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.

2.07 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken

from one package show same range of 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.

- C. Contractor shall grind, patch, float the floor substrate as required to create a level flooring surface.

3.03 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. 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 indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. 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 installing tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- H. Grout tile to comply with requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

3.04 FLOOR TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
- B. Joint Widths: Per manuf. Recommendation.
- C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet or other flooring that finishes flush with top of tile.

- D. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.05 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.
- B. Joint Widths: Install tile on walls with 1/16 inch joint widths:

3.06 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 2. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. When recommended by tile manufacturer, apply 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.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.07 FLOOR TILE INSTALLATION SCHEDULE

- A. Tile Installation: Interior floor installation on over concrete slab, thinset mortar epoxy grout; TCA F115 and ANSI A108.5.
 - 1. Tile Type: Glazed porcelain floor tile.
 - 2. Grout: Standard sanded cement grout.

3.08 WALL TILE INSTALLATION SCHEDULE

- A. Tile Installation: Interior wall installation over cementitious backer board, DensShield, or approved equal, on metal studs; organic adhesive; TCA W242 and ANSI A108.4.
 - 1. Tile Type: Glazed wall tile.
 - 2. Grout: Standard non-sanded cement grout.

END OF SECTION

SECTION 09 51 23 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.03 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.04 SUBMITTALS

- A. Samples for Initial Selection: For components with factory-applied color finishes.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- (300-mm-) long Samples of each type, finish, and color.

1.05 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations:
 - 1. National Purchasing Agreement Vendor: Armstrong World Industries, Inc., contact – Denise Warful, 800/442-4212.
 - 2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a) Smoke-Developed Index: 450 or less.

- C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 - 2. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.08 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.09 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
 - 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.02 MINERAL-BASE ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING.

- A. Products:
 - 1. As indicated on drawings", color – white.
 - 2. Panel Type C: 3/4" square cell clear paracube louver. (Restroom soffit)
- B. Classification: Provide panels complying with ASTM E 1264, Type III Form 2, and Pattern CDK.
- C. Edge Detail: Reveal sized to fit flange of exposed suspension system members.

2.03 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
 - 1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
- E. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- F. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.04 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING.

- A. Products:
 - 1. Panel Type A: Armstrong, 15/16" Prelude, color – white.
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.
 - 1. Structural Classification: Intermediate -duty system.
 - 2. End Condition of Cross Runners: Butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel cold-rolled sheet.
 - 5. Cap Finish: Painted. Color as selected by Architect.

2.05 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with UBC Standard 25-2 and seismic requirements indicated, per manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to

- support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 6. Do not attach hangers to steel deck tabs.
 7. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.66 m). Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a) As indicated on reflected ceiling plans.
 - b) Install panels with pattern running in one direction parallel to long axis of space.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.04 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components

that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 19 - RESILIENT FLOOR TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Vinyl composition tile (VCT).
 - 2. Resilient wall base and accessories.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.
 - 1. Resilient Wall Base and Accessories: Manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long, of each resilient product color and pattern required.
- C. Maintenance Data: For resilient products to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Perform moisture test of concrete floor slab in accordance with this section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store tiles on flat surfaces.

1.06 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) Insert temperature or more than 95 deg F (35 deg C) Insert temperature, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) Insert temperature or more than 95 deg F (35 deg C) Insert temperature.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install resilient products after other finishing operations, including painting, have been completed.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.02 COLORS AND PATTERNS

- A. Colors and Patterns: As selected by Architect from manufacturer's full range. Bidders shall assume for bidding purposes a random floor pattern of 4 colors throughout the facility. Pattern shall be as selected by Architect.

2.03 VINYL COMPOSITION TILE

- A. Vinyl Composition Tile (VCT): ASTM F 1066.
 - 1. Armstrong World Industries, Inc.; Excelon, Imperial Texture, Stonetex or approved equivalent from the following:
 - a) Azrock Commercial Flooring, DOMCO.
 - b) Congoleum Corporation.
 - c) Mannington Mills, Inc.
 - d) Tarkett Inc.
- B. Class: 1 (solid-color tile).
- C. Size: 12 by 12 inches (305 by 305 mm).
- D. Fire-Test-Response Characteristics:
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

2.04 RESILIENT WALL BASE

- A. Wall Base: ASTM F 1861.
 - 1. Armstrong World Industries, Inc.
 - 2. Azrock Commercial Flooring, DOMCO.

3. Burke Mercer Flooring Products.
4. Marley Flexco (USA), Inc.
5. Roppe Corporation.

- B. Style: Cove (with top-set toe).
- C. Minimum Thickness: 0.125 inch (3.2 mm).
- D. Height: 6 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Premolded.
- G. Inside Corners: Premolded.
- H. Surface: Smooth.

2.05 RESILIENT MOLDING ACCESSORY

- A. Description: Carpet edge for glue-down applications.
1. Burke Mercer Flooring Products.
 2. Marley Flexco (USA), Inc.
 3. Roppe Corporation.
- B. Material: Vinyl.
- C. Profile and Dimensions: As indicated.

2.06 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 3. Moisture Testing:
 - a) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b) Perform tests recommended by manufacturer and submit test results to Architect. Proceed with installation only after substrates pass testing.
 - c) In the event that moisture vapor emissions exceed 3lbs./1000 sq. ft./24 hrs., the Contractor, at his expense, shall install a barrier coat and moisture sealer, "J&J Commercialon 877 Premium Barrier Coat". Contractor shall apply two coats per manufacturer's instructions, prior to installation of the flooring material.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- E. Contractor shall grind, patch, float the floor substrate as required to create an even and level flooring surface.
- F. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- G. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 - 1. Do not install resilient products until they are same temperature as space where they are to be installed.
- H. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 TILE INSTALLATION

- A. 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 that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis in pattern indicated.
- B. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) in pattern of colors and sizes indicated.
- C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- D. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- G. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.04 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Premolded Corners: Install premolded corners before installing straight pieces.

3.05 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.06 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
 - a) Do not wash surfaces until after time period recommended by manufacturer.

- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 - 1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.
 - a) Use commercially available product acceptable to manufacturer.
 - b) Coordinate selection of floor polish with Owner's maintenance service.
 - 2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
 - 3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION

SECTION 09 65 43 - RESILIENT LINOLEUM SHEET FLOORING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Resilient linoleum sheet flooring.
 - 1. Homogeneous linoleum sheet flooring, adhesive installation, Topshield™ finish.
 - 2. Homogeneous linoleum sheet flooring, adhesive and heat welded seams installation.
- B. Related Sections: Section(s) related to this section include:
 - 1. Concrete: Refer to Division 3 Concrete Sections for cast-in-place concrete, concrete toppings, and cementitious underlayments.
 - 3. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM F 2034 for Linoleum Sheet Flooring
 - 2. ASTM E 648-88 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
 - 3. ASTM E 662-83 Test Method for Specific Density of Smoke Generated by Solid Materials.
 - 4. ASTM F 710-86 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
 - 5. ASTM F 970-87 Test Method for Static Load Limit.
 - 6. ASTM 492 for Impact Insulation
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 253-1984 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
 - 2. NFPA 258-1989 Test Method for Specific Density of Smoke Generated by Solid Materials.
- C. California Collaborative for High Performance Schools (CA-CHPS)
 - 1. Criteria Interpretation for EQ 2.2 dated July 2012 and listed in the CHPS High Performance Product Database

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

1.04 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's SPEC-DATA product sheet, for specified products.
- B. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns and textures.

- C. Samples: Submit selection and verification samples for finishes, colors, and textures.
- D. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.
- E. Closeout Submittals: Submit the following:
 - 1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
 - 2. Warranty: Warranty documents specified herein.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- B. Regulatory Requirements:
 - 1. Fire Performance Characteristics: Provide resilient linoleum sheet flooring with the following fire performance characteristics as determined by testing products in accordance with ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Critical Radiant Flux: Class 1 Rating per NFPA 253 (ASTM 648) (0.45 watts/cm² or greater).
 - b. Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).

1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Division 1 Product Requirements Sections.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - 1. Material should be stored in areas that are fully enclosed, weathertight with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hrs. prior to, during and after installation.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, Areas to receive flooring shall be clean, fully enclosed, weathertight with the permanent HVAC set at a uniform temperature of at least 68 degrees F (20 degrees C).

The flooring material should be conditioned in the same manner. Maximum temperature should not exceed 100 degrees F after installation.

- B. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.
 - 1. Temperature Conditions: 68 degrees F (20 degrees C) for 72 hours prior to, during and after installation.
- C. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.08 SEQUENCING AND SCHEDULING

- A. Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.
- B. Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond, moisture test, and pH test.

1.09 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 - 1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.10 MAINTENANCE

- A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.
 - 1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.
 - 2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 PRODUCTS

2.01 RESILIENT LINOLEUM SHEET FLOORING

- A. Manufacturer: Forbo Linoleum, Inc., or as indicated
- B. Proprietary Product(s): As indicated on Drawings and Linoleum Adhesive.

1. Description: Homogeneous sheet linoleum of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendered onto natural jute backing. Pattern and color shall extend throughout total thickness of material.
2. Width: 79" (2 Meters).
3. Length: 89 Linear Feet (27 Meters).
4. Gauge: 1/10" (2.5 MM).
5. Backing: Jute.
6. Pattern and Color: As selected by Architect from manufacturer's full range. Contractor shall assume for bidding purposes a decorative pattern, as selected by the Architect.
7. Adhesive: Forbo Linoleum, Inc., L910 Adhesive (US) or Forbo Linotack 414 (Canada).
8. Heat Welding Rod: Forbo Linoleum, Inc., Marmoweld color-matched welding rod.
9. Topshield™ finish

2.03 RELATED MATERIALS

- A. Related Materials: Refer to other sections for related materials as follows:
 1. Underlayment and Patching Compound: Refer to Division 3 Concrete Sections for portland cement-based underlayments and patching compounds.
 2. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient flooring accessories.

2.04 SOURCE QUALITY

- A. Source Quality: Obtain flooring product materials from a single manufacturer.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.
- B. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.

3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
- B. Surface Preparation:
 1. General: Prepare floor substrate in accordance with manufacturer's instructions.
 2. Floor Substrate: Prepare floor substrate to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as dust, paint, grease, oils, solvent, curing and hardening compounds, sealers, asphalt and old adhesive residue.

3. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3500 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials, and leveling compounds with portland cement-based compounds. Do not use or install flooring over gypsum-based leveling or patching materials.
 - a. Reference Standard: Comply with ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
- C. Concrete Moisture Test: Perform moisture tests on concrete floors regardless of the age or grade level with a minimum of three tests for the first 1000 square feet (93 m²). The test shall be a calcium chloride test. One test shall be conducted for every 1000 sq. ft. of flooring. The test shall be conducted around the perimeter of the room, at columns and where moisture may be evident. The moisture emission from the concrete shall not exceed 5.0 lbs. per 1000 sq. ft. (2.4kg/100 m²) in 24 hrs. For the most accurate results, the weight of the calcium chloride dish shall be made on the job site at the start and end of each test. A diagram of the area showing the location and results of each test shall be submitted to the architect, general contractor or end user. If the test results exceed the limitations, the installation shall not proceed until the problem has been corrected.
- D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.

3.04 INSTALLATION

- A. Adhesive Flooring Installation: Cut required length of linoleum flooring from roll, allowing enough material to extend up the wall 4 to 6 inches at either end. Layout and position sheet flooring so that any seams will fall at least 6 inches from underlayment joints or saw cuts in concrete substrate. Scribe and cut flooring material to shape of vertical surfaces, including walls and partitions. Apply adhesive and lay sheet flooring into wet adhesive and roll with a 100 pound roller. Install sheet flooring square with room axis.
 1. Adhesive, Seamless Flooring Installation: Rout out seams and heat weld together with complementary colored heat welding rod of complimentary composition in accordance with resilient flooring manufacturer's recommendations.
 2. Adhesive Flooring and Flash Coved Base Installation: Extend flooring up the wall in a flash-coved method to a height of 4 inches or 6 inches (102 or 152 mm), as indicated.
 3. Adhesive Material Installation: Use trowel as recommended by flooring manufacturer for specific adhesive. Spread at a rate of approximately 150 sq. ft./gal. (3.7 m²) as recommended by flooring manufacturer.
- B. Installation Techniques:
 1. Where demountable partitions and other items are indicated for installation on top of finished flooring, install flooring before these items are installed.
 2. Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built-in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets.
 3. Extend flooring into toe spaces, door reveals, closets, and similar openings.
 4. Install flooring on covers for telephone and electrical ducts, and similar items occurring within finish floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.
 5. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.
 6. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.

- a. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.
7. Roll resilient flooring as required by resilient flooring manufacturer.

C. Finish Flooring Patterns: As selected by Architect.

3.06 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
 1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by tile floor manufacturer.
 2. Sweep and vacuum floor after installation.
 3. Do not wash floor until after time period recommended by tile flooring manufacturer.
 4. Damp-mop tile flooring to remove black marks and soil.

3.07 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

3.08 INITIAL MAINTENANCE PROCEDURES

- A. Initial maintenance "Starter Kit" supplied by manufacturer. Initial maintenance to be conducted by flooring contractor.

END OF SECTION

SECTION 09 68 00 - CARPET

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Woven carpet.
- B. Related Sections include the following:
 - 1. Division 9 Section "Resilient Floor Tile" for resilient wall base and accessories installed with carpet.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet: 12-inch- (300-mm-) square Sample.
- C. Maintenance Data: For carpet to include in maintenance manuals specified in Division 1. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered. Refer to Division 1 Section "Substitutions."

- D. Carpet shall meet testing and product requirements for Carpet and Rug Institute's Green Label Plus Program. Carpet Cushion shall meet the requirements of the Carpet and Rug Institute's Green Label Program.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with CRI 104, Section 5, "Storage and Handling."

1.06 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.07 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.08 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.01 WOVEN CARPET TILES

- A. Available Product: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a) As indicated on drawings – quarter-turn layout, or approved equal.

2.02 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:
 - 1. Carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the following:
 - 1. Carpet manufacturer.
- C. Seaming Cement: 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.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
- E. Barrier Coat: "J&J Commercialon 877 Premium Barrier Coat"., or approved equal per manufacture's instructions.

PART 3 - EXECUTION

3.01 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.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 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 following:
 - a) Carpet manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- B. Use trowelable leveling and patching compounds, as required, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates for proper installation of flooring material.

- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the following:
 - 1. Carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Direct-Glue-Down Installation: Comply with CRI 104, Section 8, "Direct Glue-Down Installation."
- B. Moisture Testing:
 - a) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b) Perform tests recommended by manufacturer and submit test results to Architect. Proceed with installation only after substrates pass testing.
 - c) In the event that moisture vapor emissions exceed 3lbs./1000 sq. ft./24 hrs., the Contractor, at his expense, shall install a barrier coat and moisture sealer, "J&J Commercialon 877 Premium Barrier Coat". Contractor shall apply two coats per manufacturer's instructions, prior to installation of the flooring material.
- C. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
 - 1. Bevel adjoining border edges at seams with hand shears.
 - 2. Level adjoining border edges.
- D. Do not bridge building expansion joints with carpet.
- E. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

3.04 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.

- B. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from a full range of colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, suspended ceiling tiles and suspension grids, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish. Painting shall include exposed mechanical registers and grills.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels, unless otherwise noted.
 - 1. Prefinished items include the following factory-finished components:
 - a) Acoustical wall panels, uon
 - b) Metal toilet enclosures.
 - c) Metal lockers.
 - d) Elevator entrance doors and frames.
 - e) Elevator equipment.
 - f) Light fixtures (Not including trims).
 - g) Drinking Fountains.
 - h) Fire Extinguisher Cabinets
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a) Furred areas.
 - b) Ceiling plenums.
 - c) Pipe spaces.
 - d) Duct shafts.
 - e) Elevator shafts.
 - 3. Finished metal surfaces include the following:
 - a) Anodized aluminum, UON.
 - b) Stainless steel.
 - c) Chromium plate.
 - d) Copper and copper alloys.
 - e) Bronze and brass.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - a) Valve and damper operators.
 - b) Linkages.
 - c) Sensing devices.

- d) Motor and fan shafts.
- 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

- D. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel" for shop priming structural steel.
 - 2. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
 - 3. Division 8 Section "Steel Doors and Frames" for factory priming steel doors and frames.
 - 4. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

1.03 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 2. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.04 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 - 3. Submit Four samples on the following substrates for Architect's review of color and texture only:
 - a) Concrete: 4-inch- (100-mm-) square samples for each color and finish.
 - b) Stained or Natural Wood: 4-by-8-inch (100-by-200-mm) Samples of natural- or stained-wood finish on representative surfaces.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain for each coating system from the same manufacturer as the finish coats.

- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
 - 1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a) Wall Surfaces: Provide samples on at least 5 sq. ft..
 - b) Small Areas and Items: Architect will designate items or areas required.
 - 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - a) After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
 - 3. Final approval of colors will be from benchmark samples.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.07 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements.
 - 1. Benjamin Moore & Co. (Benjamin Moore).
 - 2. Dunn Edwards Paints

2.02 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: As selected by Architect from manufacturer's full range. Contractor shall assume for bidding purposes that a min. of 6 interior colors and 6 exterior colors will be used at various locations and quantities throughout the project.

2.03 EXTERIOR PRIMERS

- A. Exterior Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex primer for exterior application.
 - 1. Benjamin Moore; Moore's Acrylic Masonry Sealer No. 066: Applied at a dry film thickness of not less than 0.7 mils (0.018 mm).
- B. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
 - 1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).

2.04 INTERIOR PRIMERS

- A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
 - 1. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
- B. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
 - 1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).

2.05 EXTERIOR FINISH COATS

- 1. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.
- 2. Benjamin Moore; Moorcraft Super Spec Latex House & Trim Paint No. 170: Applied at a dry film thickness of not less than 1.1 mils (0.028 mm).

2.06 INTERIOR FINISH COATS

- A. Interior Acrylic Enamel: Factory-formulated eggshell & satin acrylic-latex enamel for interior application.
 - 1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell & Satin Enamel: Applied at a dry film thickness of not less than 1.2 mils (0.031 mm).

2.07 INTERIOR WOOD STAINS AND VARNISHES

- A. Open-Grain Wood Filler: Factory-formulated paste wood filler applied at spreading rate recommended by manufacturer.
 - 1. Benjamin Moore; Benwood Paste Wood Filler No. 238.
- B. Interior Wood Stain: Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.
 - 1. Benjamin Moore; Benwood Penetrating Stain No. 234.
- C. Clear Sanding Sealer: Factory-formulated fast-drying alkyd-based clear wood sealer applied at spreading rate recommended by manufacturer.
 - 1. ICI Dulux Paints; 1902-0000 WoodPride Interior Satin Polyurethane Varnish.
- D. Interior Alkyd- or Polyurethane-Based Clear Satin Varnish: Factory-formulated alkyd- or polyurethane-based clear varnish.
 - 1. Benjamin Moore; Benwood Interior Wood Finishes Polyurethane Finishes Low Lustre No. 435.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
 - 3. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel 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.
 - a) Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b) 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 if moisture content exceeds that permitted in manufacturer's written instructions.
 - c) Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a) Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b) Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c) If transparent finish is required, backprime with spar varnish.
 - d) Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e) Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a) Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.
 - 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 - 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 - 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 - 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 - 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 - 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 - 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

- F. Mechanical items to be painted include, but are not limited to, the following:
 - 1. Tanks that do not have factory-applied final finishes.
 - 2. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - 3. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:
 - 1. Panelboards.
- H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- J. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
 - 1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
 - 2. Testing agency will perform appropriate tests as required.

3.05 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
 - 1. After completing painting, clean paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.06 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.07 EXTERIOR PAINT SCHEDULE

- A. Concrete, Stucco, and Concrete Unit Masonry: Provide the following finish systems over exterior concrete, stucco, and brick masonry substrates:
 1. Acrylic-Enamel Finish: Two finish coats over a primer.
 - a) Primer: Exterior concrete and masonry primer.
 - b) Finish Coats: Exterior semigloss acrylic enamel.
 2. Clear concrete/masonry sealer
 3. Provide grafftti coat sealer at all masonry locations (interior & exterior)
- B. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
 1. Semigloss Acrylic-Enamel Finish: Two finish coats over a rust-inhibitive primer.
 - a) Primer: Exterior ferrous-metal primer.
 - b) Finish Coats: Exterior semigloss acrylic enamel.

3.08 INTERIOR PAINT SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 1. Eggshell Acrylic-Enamel Finish: Two finish coats over a primer.
 - a) Primer: Interior gypsum board primer.
 - b) Finish Coats: Interior eggshell acrylic enamel.
 2. Flat Acrylic-Enamel Finish: Two finish coats over a primer.
 - a) Primer: Interior gypsum board primer.
 - b) Finish Coats: Interior Flat acrylic enamel.
- B. Ferrous Metal: Provide the following finish systems over ferrous metal:
 1. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.
 - a) Primer: Interior ferrous-metal primer.
 - b) Finish Coats: Interior semigloss acrylic enamel.

3.09 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

- A. Stained Woodwork: Provide the following stained finishes over new interior woodwork:
 1. Alkyd-Based Stain Satin-Varnish Finish: Two finish coats of alkyd-based clear satin varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.
 - a) Stain Coat: Interior wood stain.
 - b) Sealer Coat: Clear sanding sealer.
 - c) Finish Coats: Interior alkyd- or polyurethane-based clear satin varnish.

END OF SECTION

SECTION 10 14 00 - SIGNAGE

PART 1 - PART 1 - GENERAL

1. RELATED DOCUMENTS

- a) Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

2. SUMMARY

- i. This Section includes exterior and interior signage.

3. DEFINITIONS

- a) ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

4. SUBMITTALS

- a) Shop Drawings: Show fabrication and installation details for signs.
 - i. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - ii. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- c) Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - i. Panel Signs: Not less than 12 inches square.
 - ii. Accessories: Manufacturer's full-size unit.
- e) Maintenance Data: For signs to include in maintenance manuals.
- f) Warranty: Special warranty specified in this Section.

5. QUALITY ASSURANCE

- b) Installer Qualifications: An employer of workers trained and approved by manufacturer.
- c) Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- d) Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- f) Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

6. PROJECT CONDITIONS

- b) Weather Limitations: Proceed with installation only when weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- c) Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

7. COORDINATION

- b) Coordinate placement of anchorage devices with templates for installing signs.

8. WARRANTY

- b) Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - i. Failures include, but are not limited to, the following:
 - i. Deterioration of metal and polymer finishes beyond normal weathering.
 - ii. Deterioration of embedded graphic image colors and sign lamination.
 - i. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

1. SIGNS

- a) Exterior Signs:
 - i. All building entrances that are accessible to and usable by persons with disabilities shall be identified with at least one standard sign (International accessibility symbol) with additional directions signs, as required, to be visible to persons along approaching pedestrian ways and paths-of-travel.
- b) Interior Signs:
 - i. General: Each room shall be provided with Room Identification signage. All Signage shall comply with the California Building Code (CBC), Section 1117B.5 Signs and identification.
 - ii. All doors within the building shall receive signage With California Braille identification (larger than typical ADA Braille). The Braille shall be grade 2 with 1/10th inch on centers within each cell with 2/10th inch between cells. Dots shall be raised 1/40th inch above background. Letters and numbers on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width to height ratio between 1:5 and 1:10. Signs shall be mounted 60" A.F.F. and 4"-6" from strike side of doors. Each toilet room shall have required identification signs (on Door and on adjacent wall), which contain the international symbol of accessibility in white on a blue background, color number 15090 in Federal Standard 595B.

2. MATERIALS

- c) Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- e) Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi when tested according to ASTM D 790.
- f) Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- g) Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.

3. PANEL SIGNS

- b) Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
 - i. Aluminum Sheet: 0.125 inch thick.
 - ii. Fiberglass Sheet: 0.125-inch- thick sheet.
 - iii. Edge Condition: Bullnose.
 - iv. Corner Condition: Square.
 - v. Mounting: As indicated.
 - vi. Color: As selected by Architect from manufacturer's full range.
- f) Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - i. Panel Material: Opaque acrylic sheet.
 - ii. Raised-Copy Thickness: Not less than 1/32 inch.
- i) Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing.

4. ACCESSORIES

- b) Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

5. FABRICATION

- a) General: Provide manufacturer's standard signs of configurations indicated.
 - i. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - ii. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - iii. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - iv. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

6. FINISHES, GENERAL

- a) Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- b) Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- c) Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not

acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

7. ALUMINUM FINISHES

- e) Color Anodic Finish: Manufacturer's standard Class 1 integrally colored or electrolytically deposited color anodic coating, 0.018 mm or thicker, in black applied over a polished (buffed) mechanical finish, complying with AAMA 611.

8. ACRYLIC SHEET FINISHES

- a) Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

1. EXAMINATION

- a) Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- b) Verify that items, including anchor inserts, are sized and located to accommodate signs.
- c) Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- a) Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - i. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - i. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- d) Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - i. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

3. CLEANING AND PROTECTION

- a) After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION

SECTION 10 21 13 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes solid color reinforced composite-core units as follows:
 - 1. Toilet Enclosures: Floor anchored.
 - 2. Urinal Screens: Wall hung.
- B. Related Sections include the following:
 - 1. Division 10 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.04 QUALITY ASSURANCE

- A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 SOLID COLOR REINFORCED COMPOSITE CORE UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. High Density Polyethylene by Scranton Products, or approved equal.
- B. Door, Panel and Pilaster Construction: Solid color throughout with eased and polished edges. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels.
 - 1. Color: One color in each room as selected by Architect from manufacturer's full range of colors.

- C. Pilaster Shoes: Stainless steel, ASTM A 666, Type 302 or 304, not less than 0.0312 inch (0.8 mm) specified thickness and 3 inches (75 mm) high, finished to match hardware.
- D. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.

2.02 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.03 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.
- B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- C. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be accessible to people with disabilities.
 - 1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
 - 2. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
 - 3. Coat Hook: Manufacturer's heavy duty combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
 - 4. Door Bumper: Manufacturer's heavy duty rubber-tipped bumper at out-swinging doors.
 - 5. Door Pull: Manufacturer's heavy duty unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a) Pilasters and Panels: 1/2 inch (13 mm).
 - b) Panels and Walls: 1 inch (25 mm).
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with not less than two brackets attached near top and bottom of panel.
 - a) Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b) Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (50 mm) into structural floor, unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Wall-Hung Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.02 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 10 22 00 - OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Manually operated, individual panel operable partitions.
- B. Related Sections include the following:
 - 1. Division 03 Sections for concrete tolerances required.
 - 2. Division 06 Sections for wood framing and supports, and all blocking at head and jambs as required.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
- B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report upon request.
- C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 "Standard Guide for the Installation of Operable Partitions."

1.4 SUBMITTALS

- A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.
- B. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.
- D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.6 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Warranty period: Two (2) years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS, PRODUCTS, AND OPERATION

A. Manufacturers: Subject to compliance with requirements, provide product by the following:

1. Modernfold, Inc.

B. Products: Subject to compliance with the requirements, provide the following product:

1. Acousti-Seal #931 manually operated individual panel operable partition.

2.2 OPERATION

A. Acousti-Seal #931: Series of individual flat panels, manually operated, top supported with operable floor seals.

B. Final Closure:

1. Horizontally expanding panel edge with removable crank.
2. Hinged panel closure.
3. Enclose.
4. Pass door closure.

2.3 PANEL CONSTRUCTION

A. Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 18-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.

B. Panel Skin Options:

1. Roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction. Acoustical ratings of panels with this construction:
2. 50 STC

C. Hinges for Closure Panels, Pass Doors, and Pocket Doors shall be (select one):

1. SOSS® Invisible laminated hinge with antifriction segments mounted between each heat treated link. Hinge to be attached directly to panel frame. Welded internal hinge bracket shall support the hinge and allow for adjustment of hinge plates. Concealed hinges mounted into edge or vertical astragal are not acceptable (available on steel skin panel only).

D. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.

E. Panel Weights:

1. 50 STC - 8 lbs./square foot

2.4 PANEL FINISHES

A. Panel face finish shall be (select as required):

1. Reinforced heavy duty vinyl with woven backing weighing not less than 27 ounces per lineal yard.

B. Panel trim: Exposed panel trim of one consistent color.

2.5 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic astragals or astragals in only one panel edge are not acceptable.

B. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.

C. Horizontal Bottom Seals :

1. Modernfold IC2 bottom seal: Manually activated operable bottom seals with removable handle providing nominal 2-inch (51mm) operating clearance with an operating range of +1/2-inch (13mm) to -1-1/2 inch (38mm). Seal shall be operable from panel edge or face.

2.6 SUSPENSION SYSTEM

A. #17 Suspension System

1. Suspension Tracks: Minimum 11-gage, 0.12-inch (3.04 mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 3/8-inch (9.5 mm) diameter threaded rods. Aluminum track is not acceptable.
 - a. recessed track soffit: Steel, integral to track, and pre-painted off-white.
2. Carriers:
 - b. "Smart Track™": Two all-steel trolleys with steel tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.
- B. Install operable partitions and accessories after other finishing operations, including painting have been completed.
- C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

- A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that insure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

- A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION

SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Toilet and bath accessories.
- B. Related Sections include the following:
 - 1. Division 10 Section "Toilet Compartments" for compartments and screens.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
 - 1. Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions."
 - 2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.05 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.06 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
 - 1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Bobrick Washroom Equipment, Inc. (Model numbers indicated)
- B. American Specialities, Inc
- C. Bradley Corporation

2.02 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.
- C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9-mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).
- E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- G. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- H. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.03 FABRICATION

- A. General: One, maximum 1-1/2-inch- (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each

accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

- B. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- C. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- D. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.
- E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.03 TOILET AND BATH ACCESSORY SCHEDULE

- A. Combination Towel Dispenser/Waste Receptacle, B-3803 (1 per restroom):
 - 1. Recessed Type: Designed for nominal 6-inch (100-mm) wall depth with continuous, seamless wall flange; towel dispenser in unit's upper compartment designed to dispense minimum of 600 C-fold or 800 multifold paper towels; waste receptacle in unit's lower compartment with minimum 6-gal. capacity, reusable, vinyl liner; and flush doors on upper and lower compartments with continuous hinges and tumbler locksets.
- B. Grab Bars, B-6806:

1. Stainless-Steel Nominal Thickness: Minimum 0.05 inch (1.3 mm).
 2. Mounting: Concealed with manufacturer's standard flanges and anchors.
 3. Gripping Surfaces: Manufacturer's standard slip-resistant texture.
 4. Outside Diameter: 1-1/2 inches (38 mm) for heavy-duty applications.
- C. Mop and Broom Holder, B-239 (1 per ea Janitor Room):
1. Mop and Broom Holder with Utility Shelf: 36-inch- (914-mm-) long unit fabricated of minimum nominal 0.05-inch- (1.3-mm-) thick stainless steel with shelf; support brackets for wall mounting; three hooks for wiping rags; four spring-loaded, rubber hat, cam-type, mop/broom holders mounted on front of shelf; and approximately 1/4-inch- (6-mm-) diameter, stainless-steel rod suspended beneath shelf for drying rags.
- D. Toilet Tissue Dispenser, B-2888 (1 per ea. toilet stall)
- E. Toilet Seat Cover Dispenser, B-221 (1 per ea. toilet stall)
- F. Sanitary Napkin Receptacle, B-254 (1 per ea. women's toilet stall)
- G. Soap Dispenser, B-8221 (1 per ea. lavatory basin)
- H. Baby Changing Station, B-2210, with paper liners, part No. 2210-40, (1 per ea. restroom)

END OF SECTION

SECTION 10 71 13 – EXTERIOR SUN CONTROL DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A Section includes Aluminum Sunshade Systems, including accessories, mountings, and shims. Sunshades are anchored directly to the vertical and/or horizontal mullions.

1.03 Versoleil™ Horizontal Single Blade SunShade:

- A Related Sections:
 - 1.Division 084113 "Aluminum-Framed Entrances and Storefronts".

1.04 DEFINITIONS

- A Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.05 PERFORMANCE REQUIREMENTS

- A Structural Performance:
 - 1.Combined load on sunshade configurations to be determined in accordance with ASCE 7 or applicable code requirements. Combined load consists of wind, snow and ice loads
 - 2.Design sunshade configurations to withstand stresses due to combined load. Stresses resulting from thermal expansion/contraction, shall not cause permanent deformation of sunshade assemblies or disengagement from the glazed system.
 - 3.Test horizontal and vertical sunshade configurations to meet a minimum load of 65 psf with a factor of safety of 2 times the design load for the horizontal blade and a factor of safety of 1.5 times the design load for the vertical blade.
 - 4.The assembled sunshade shall be capable of supporting a uniformly distributed load of 15 psf without damage, permanent deformation, or disengagement from the glazed system mullion.
 - 5.Blade deflection shall not exceed L/120 of span length.
 - 6.Submit test reports verifying compliance with each test requirement required by the project.
- B Shading Performance:
 - a) Design shall allow for one time adjustment of the aerofoil blade angle and size to optimize the shading performance based on project location, latitude, altitude, building orientation, surrounding conditions, and aesthetic requirements.
 - 2. Blades shall be capable of orientations of:
 - 3. Horizontal sunshade configurations: Clockwise is positive and anti-clockwise negative - 5°,
 - 4. Following blade sizes in inches (in mm)]: 8"(203),).
- C Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - 1.Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

1.06 SUBMITTALS

- A Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B Shop Drawings: For aluminum exterior sunshades. Include plans, elevations, sections, blade angles, blade spacing and attachments to compatible systems.
- C Samples for Initial Selection: For units with factory-applied color finishes.
- D Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.07 QUALITY ASSURANCE

- A Installer Qualifications: Installer who has had successful experience with installation of the same or similar systems required for the project and other projects of similar size and scope.
- B Manufacturer Qualifications: A manufacturer capable of fabricating exterior sunshades, and glazed aluminum curtain wall and storefront systems, that meet or exceed performance requirements.
- C Source Limitations: Obtain aluminum exterior sunshades and glazed aluminum curtain walls and storefront systems through one source from a single manufacturer.
- D Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- E Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for type(s) of sunshade elevation(s) indicated, in location(s) shown on Drawings.
- F Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".

1.08 PROJECT CONDITIONS

- A Field Measurements: Verify actual locations of structural supports for sunshades by field measurements before fabrication and indicate measurements on Shop Drawings.

1.09 WARRANTY

- A Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A Basis-of-Design Product:
 - 1. Versoleil™ Single Blade Horizontal Sunshade, Versoleil™ Single Blade Vertical Sunshade by Kawneer Company Inc, or approved equal.
- B Substitutions: Refer to Substitutions Section for procedures and submission requirements.

- 1.Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
 - 2.Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid sunshade installation and construction delays.
 - 3.Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
 - 4.Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
 - 5.Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.
- C Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.02 MATERIALS

- A Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall and storefront system manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6, 6105-T5, or 6061-T6 alloy and temper.
- B Thermal Barrier: When applied on a thermally broken compatible system, sunshade shall be thermally isolated from the interior aluminum mullions by a nominal 0.25" thick low conductance material.
- C Aluminum sheet alloy: Shall meet the requirements of ASTM B209.
- D Sealant: For sealants required within fabricated sunshade system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- E Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall and storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 SUNSHADES

- A Sunshade Members: Manufacturer's standard extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- B Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
- C Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- D Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- E Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle sunshade materials and components to avoid damage. Protect sunshade materials against damage from elements, construction activities, and other hazards before, during and after installation.

2.04 ACCESSORY MATERIALS

- A Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.05 FABRICATION

- A Form or extrude aluminum shapes before finishing.
- B Fabricate components that, when assembled, have the following characteristics:
 - 1.Profiles that are straight, and free of defects or deformations.
 - 2.Accurately fitted joints with ends coped or mitered.
 - 3.Physical and thermal isolation of glazing from framing members.
 - 4.Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5.Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C Sunshade: Fabricate components for assembly following approved shop drawings and/or manufacturer's standard installation instructions.
- D After fabrication, clearly mark components to identify their locations in Project according to approved shop drawings.

2.06 ALUMINUM FINISHES

- A Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B Factory Finishing:
 - 1.Kawneer Permanodic® AA-M10C22A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear) (Standard).

PART 3 - EXECUTION

3.01 EXAMINATION

- A Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A General:
 - 1.Comply with manufacturer's written instructions. Refer to installation instructions of the compatible curtain wall or storefront system.
 - 2.Please note that the installation instructions can differ from one compatible system to another one.
 - 3.Do not install damaged components.
 - 4.Fit joints to produce hairline joints free of burrs and distortion.
 - 5.Rigidly secure non-movement joints.
 - 6.Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 7.Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - 8.Seal joints watertight where shown on approved shop drawings and/or manufacturer's standard installation instructions.
- B Metal Protection:
 - 1.Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2.Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C Install components plumb and true in alignment with established lines and grades.
- D Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.03 ADJUSTING, CLEANING AND PROTECTION

- A Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum sunshade system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
- B Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- C Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 12 24 13 – ROLL DOWN WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manually operated sunscreen roller shades.
- B. Electrically operated sunscreen roller shades.
- C. Local group and master control system for shade operation with addressable motors.

1.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.
- B. Section 09260 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.
- C. Section 09510 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.
- D. Division 16 - Electrical: Electric service for motor controls.

1.3 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
- C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

- D. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- E. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of ten years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of three years experience in installing products comparable to those specified in this section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 WARRANTY

- A. Roller Shade Hardware, Chain and Shadecloth Manufacturer's standard non-depreciating twenty-five year limited warranty.
- B. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five-year warranty.
- C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: MechoShade Systems, Inc. or approved equal

- B. Substitutions: Substitutions shall be submitted in writing and Architect shall have final authority of acceptance.

2.2 APPLICATIONS/SCOPE

A. Roller Shade Schedule:

Provide window coverings at all interior & exterior window locations at windows with a head height of 14' and below:

1. Shade Type 1: Manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the Drawings.
2. Shade Type 2: Motorized interior solar roller shades, and related motor control systems at Windows R & Q.

2.3 SHADE CLOTH

- A. Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., ThermoVeil group, single thickness non-raveling 0.030-inch (0.762 mm) thick vinyl fabric, woven from 0.018-inch (0.457 mm) diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl, in colors selected from manufacturer's full range.

1. Dense Basket Weave: "1500 series", 3 percent open, 2 by 2 dense basket-weave pattern
 - a. Color: Selected from manufacturer's full range of colors.

- B. Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., EuroTwill "6000" Series: 0.010 diameter (0.254 mm) non-raveling vinyl/polyester yarn, fabric thickness 0.025 inches (0.635 mm).

1. Extra Dense Twill Weave "6000" series, 2-3 percent open.
 - a. Color: Selected from manufacturer's full range of colors.

2.4 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
2. Shade band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive / brake mechanism.

- c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
- d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
- e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 - 1. Bottom hem weights.
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.6 COMPONENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.
- B. Motorized Shade Hardware and Shade Brackets:

1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.
2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).

C. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable
7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
8. Drive Bracket / Brake Assembly:
 - a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
 - b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
 - c. The brake shall be an over -running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.

- d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
 - e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
- D. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.7 ACCESSORIES

- A. Roller Shade Pocket for recessed mounting in acoustical tile, or drywall ceilings as indicated on the Drawings
 - 1. Provide either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
- B. Fascia (for outside mount shades)
 - 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 - 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 - 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 - 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 - 5. Notching of Fascia for manual chain shall not be acceptable.
 - a. Color: Selected from manufacturer's full range of colors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

McKINLEYVILLE TEEN CENTER

CIP # 117

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 48 13 - ENTRANCE FLOOR MATS AND FRAMES

Part 1 General

1.01 Summary

A. This section includes the following types of entrance flooring systems:

- | | | | | | |
|----|-------|------|---|-------|------------|
| 1. | Floor | Mats | & | Frame | Assemblies |
|----|-------|------|---|-------|------------|

B. Related Sections: The following sections contain requirements related to this section:

1. Grouting frames into recess; refer to sections 03300 "Cast-In-Place Concrete"

1.02 References

1. American Society for Testing and Materials (ASTM)
2. The Aluminum Association
3. The Carpet and Rug Institute (CRI)
4. The National Floor Safety Institute (NFSI)

1.03 Submittals

1. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01300.
2. Product data for each type of floor mat/grid and frame specified including manufacturer's specifications and installation instructions.
3. Shop drawings in sufficient detail showing layout of mat/grid and frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.
4. Samples for verification purposes: Submit an assembled section of floor mat/grid and frame members with selected tread insert showing each type of color for exposed floor mat/grid, frame and accessories required.
5. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats/grids.

1.04 Quality Assurance

1. Flammability in accordance with ASTM E648, Class 1, Critical Radiant Flux, minimum 0.45 watts/m².
2. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.
3. Standard rolling load performance to be 1000 lb./wheel (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).
4. Single Source Responsibility: Obtain floor mats/grids and frames from one source of a single manufacturer.
5. Utilizes superior structural aluminum alloy 6105-T5 for rail components.

1.05 Delivery, Storage and Handling

A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.06 Project Conditions

A. Field measurements: Check actual openings for mats/grids by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

B. For recess application coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

Part 2 Products

2.01 Manufacturers

A. Drawings and specifications are based on manufacturer's literature from Construction Specialties, Inc. unless otherwise indicated. Other manufacturers must comply with the minimum levels of material and detailing indicated on the drawings and specified herein.

2.02 Materials

A. Aluminum - ASTM B 221, alloy 6105-T5, 6105-T6 for extrusions.

B. Flexible and prime EPDM extrusions.

C. Tread insert options - refer to section 2.05.

2.03 Floor Mats

A. Model and Description - G4 PediTred shall be extruded 6105-T5 aluminum alloy with 3/4" deep tread rails joined by an EPDM hinge and cushion to compromise the overall grid length (traffic direction). The hinge shall be complete with perforations between each tread rail for drainage, unless otherwise specified. Rail finish color shall be powder coated and selected by Architect from manufacturer's full range. Unit must withstand 1000 lb. wheel loads (load applied to a 5" x 2" wide polyurethane wheel, 1000 passes without damage).

2.04 Mat Frames

A. LB - Level Base Frame shall be a 1" (25.4mm) deep recessed frame in 6063-T6 aluminum alloy with a 1/4" (6.4mm) wide exposed surface. Black EPDM filler trims shall be furnished as required, when standard 1 1/2" (38.1mm) tread spacing cannot be maintained. Installer shall use recommended latex screed to ensure level base. Frame color shall be powder coated and selected by Architect from manufacturer's full range.

2.05 Tread Insert Options

1. HD – MonoTuft HDTM Carpet shall meet CRI standard for good indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Available in one of 21 standard colors as offered by manufacturer. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free

lengths. Anti-static carpet fibers shall contain antimicrobial additive and be treated with Scotchgard® to reduce soiling. Carpet weight shall be 33-oz./yd².

Part 3 Execution

3.01 Examination

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Preparation

A. Manufacturer shall offer assistance and guidance to provide a template of irregular shaped mat/grid assemblies to ensure a proper installation.

3.03 Installation

1. Install the work of this section in strict accordance with the manufacturer's recommendations.
2. Set mat/grid at height recommended by manufacturer for most effective cleaning action.
3. Coordinate top of mat/grid surfaces with bottom of doors that swing across to provide ample clearance between door and mat/grid.

3.04 Cleaning

A. It is important to the life cycle of the entrance mat that a maintenance schedule be developed which includes regular vacuuming and extraction that correctly matches the amount of traffic the mat incurs.

3.05 Protection

A. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.

B. Defer installation of floormats /grids until time of substantial completion of project.

END OF SECTION

SECTION 21 00 00 - FIRE SUPPRESSION

PART 1- GENERAL

- A. The General Conditions apply to this Section, also applicable provisions of Division 22 & 28.
- B. All of the specific conditions of the preceding "General Requirements for the Mechanical Trades" are included as a part of these specifications.
 - 1) This specification includes the complete installation and furnishing of all labor materials, equipment and supplies required for the performance of all operations relating to the Fire Protection System.
 - 2) All work shall be done in a first-class and workmanlike manner, complete in all respects, and including all items specified herein, or as necessary for the accomplishment of a complete satisfactory and approved installation.
- C. Scope
 - 1) Connection to city water main.
 - 2) Underground fire main.
 - 3) Excavation and backfill.
 - 4) Post Indicator Valve.
 - 5) Pumper Siamese Connection.
 - 6) Automatic Sprinkler Riser.
 - 7) Wet Pipe Sprinkler System.
 - 8) Flow Switches.
 - 9) Detailed Layout Drawings.
 - 10) Hydraulic Calculations.
- D. Work By Electrical Contractor
 - 1) Electrical Contractor shall provide power to the alarm system.
 - 2) The Fire Protection Contractor shall connect the power to the alarm system and be responsible for its operation.
- E. Work By Alarm Contractor
 - 1) Furnish and install local and remote fire alarm systems as required by local code.
 - 2) Furnish, install, and connect tamper switches.
 - 3) The Alarm Contractor shall connect the power to the alarm system and be responsible for its operation.

F. Regulations

- 1) The Fire Protection System under these specifications shall be in accordance with the Standards of the National Fire Protection Association (NFPA) and all other authorities having jurisdiction.
- 2) Failure on the part of the Sprinkler Contractor to fulfill the above requirements will not relieve him of the responsibility of executing all work necessary for a complete and approved installation without extra expense to the Owner.
- 3) The contractor shall prepare any detailed diagrams, drawings and calculations which may be required by any governing authorities.

G. Service Fees

- 1) The Fire Protection Contractor shall apply for and pay all inspection, permit, license, and other service fees required by the local authorities in connection with the work under this Contract.

H. Excavation

- 1) The Fire Protection Contractor shall do all excavating required for the installation of all piping.
- 2) All excavations shall be made in compliance with the plans, and in such manner, and to such depths and widths, as will give ample room for installing the pipes; for bracing, sheeting or otherwise supporting the sides of the excavation, and for the pumping of ground water if encountered.
- 3) The bottoms of trenches must be carefully excavated and trimmed to the elevation and shape of the bottom of the pipe wall. The bottom of each trench shall be recessed to receive the hubs of bell and spigot pipe to be uniformly supported on firm undisturbed earth for its entire length.
- 4) Corrections in depth of excavation, caused by excavating to an extent greater than that required for the elevation of the pipes, shall be made by bedding the pipe with coarse gravel, thoroughly settled, or by a dry cement-sand-gravel mixture placed at the time the pipes are being installed.
- 5) Where pipes are laid in firm undisturbed earth, excavation may be done at such time as required to suit the progress of the work. Where pipes occur in disturbed or filled ground the excavation shall be done only after the backfill has been finally settled and made ready for constructing the floor slabs or pavements.
- 6) The site shall be inspected so that provision is included in job cost for rock excavation or any other unusual condition.

I. Backfilling

- 1) After the underground piping has been laid, and all tests have been made and approved, the trenches shall be backfilled as follows:

- 2) Backfill under and within 10 feet of floors, walks and roads shall be clean sand placed in 6" - 8" layers for full depth of excavation.
- 3) Backfill outside of building shall be clean soil to 12" over the buried lines. The remaining depth of backfill may be excavated earth, free of rocks, clay, cinders, brickbats or other debris.
- 4) Tracer wire and caution tape shall be laid per latest NFPA and Fire Department requirements.
- 5) All backfill should be tamped in 6" to 8" layers with heavy hand or pneumatic tampers.
- 6) Surplus earth from these excavation shall be removed from the premises by this Contractor.

J. Shoring

- 1) The Fire Protection Contractor shall provide all shoring, bracing, or sheet pilings necessary to maintain the banks of the excavations and he shall remove same as the work progresses and as the filling is accomplished, unless otherwise ordered by the General Contractor. The arrangement of shoring must be such as to prevent any movement of the trench banks. All timber used in shoring shall be removed on completion of the work. Timber which cannot be removed shall remain in place at the expense of the Contractor.

K. Pumping

- 1) The Fire Protection Contractor shall do all pumping required to keep his excavations free of water.

L. Underground Pipe & Fittings

- 1) This Contractor shall furnish and install all underground pipe, fittings, valves, rods, clamps, etc. as required for a complete approved underground fire protection system.
- 2) All underground pipe and fittings shall be approved Johns-Manville C900 Bluebrute. Joints shall be ring-tight or mechanical joints.
- 3) All underground pipe and fittings shall be anchored in accordance with the NFPA recommendations at all changes in direction and elsewhere as required.
- 4) All underground pipe outside the building shall be installed with not less than the minimum cover as recommended by NFPA. Where necessary to avoid other underground services, pipe shall be offset down to maintain the minimum cover.

M. Post Indicating Valves

- 1) Furnish and install Post Indicating Valves for the Automatic Sprinkler Risers, as required. Post Indicator Valves shall have a glass-covered indicator and tamper switches.

N. Automatic Sprinkler Risers & Alarm Check Valves

- 1) Furnish Automatic Sprinkler Riser as required for the building.

- 2) In each Automatic Sprinkler Riser provide an approved alarm check valve complete with all trimmings required by NFPA. Furnish a 2-pole electric flow switch and a local alarm gong. The second pole of switch will be utilized by the owner for the centrally located building protection alarm system.
- O. Portable Fire Extinguishers
- 1) Portable Fire Extinguishers of type and quantities required by the NFPA and locations as indicated on the drawings.
- P. Siamese Pumper Connection
- 1) Furnish a Siamese Pumper Connection where required.
- Q. Overhead Piping
- 1) For overhead work, the weight, size, and type of pipe and fittings shall be in accordance with the latest schedule of the NFPA.
 - 2) All main piping shall be placed to leave not less than 12" between the sides of the pipes and any electric light outlets. Branch pipes, located not more than 10" from the ceilings, shall clear the light outlets by 6" or as otherwise required to avoid light reflectors.
 - 3) All sprinkler piping shall be offset where required to meet requirements of other trades.
 - 4) All sprinkler piping shall be supported in an approved manner by means of approved hangers. Pipe 2" and over shall be supported from panel points only.
 - 5) No drilling of any structural member will be allowed without the approval of the Structural Engineer.
- R. Sprinkler Heads
- 1) Unfinished Areas: Sprinkler heads shall be upright automatic spray type of ordinary degree temperature rating. Sprinkler heads installed in the vicinity of heat producing equipment shall be of the temperature rating required by the NFPA.
 - 2) Finished Areas: In finished ceiling areas, the sprinkler heads shall be an automatic spray type of ordinary degree temperature rating. Sprinkler heads shall be quick response type and have flush assembly plate cover. Color to match the ceiling. Contractor shall assume four (4) separate ceiling colors.
 - 3) Sprinkler heads shall be located symmetrically with respect to ceiling tiles, patterns within ceiling tiles, lighting fixtures and air diffusers.
 - 4) The Sprinkler Contractor shall furnish four (4) spare heads, packed in a suitable container. Heads shall be representative, and in proportion to the number of each type and temperature rated heads installed. In addition, furnish not less than two (2) special sprinkler head wrenches.
- S. Drains
- 1) Required valved drains shall be provided at base of risers and at low points of overhead systems where they will not drain by gravity. A. S. R. drains shall be piped to outside of building.

T. Flushing

- 1) Flush underground system in accordance with NFPA Standards.

U. Test Of Completed System

- 1) Test of the underground piping shall be made as the installation progresses and before the trenches are completely backfilled.
- 2) Upon completion of the work, the Fire Protection Contractor shall notify the proper insurance authorities and arrange with them to have their authorized inspector in attendance when final job inspection and tests are conducted.
- 3) All parts of the completed system shall be hydrostatically pressured-tested at 200 pounds per square inch for a minimum two (2) hour period. All defects made evident by the tests shall be properly repaired by this Contractor. Leaks in overhead lines shall be repaired only by means of tightening or replacing the fittings and not by resorting to any caulking method.

V. Hazard Classification

- 1) The entire building is to be sprinklered, new and existing.
- 2) The Sprinkler System shall be installed on a Light Hazard Schedule.

W. Water Supply

- 1) The water supply for the Fire Protection System shall be as shown on the Plumbing Site Plan.

END OF SECTION

SECTION 22 00 00 - PLUMBING, COMMON WORK

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. This Section covers plumbing work, complete. Furnish material, labor, and equipment in accordance with these Specifications, the accompanying Drawings, and the directions of the Engineer.

1.2 CODES, PERMITS, AND REGULATIONS

- A. Do all work and install materials and equipment in accordance with the requirements of the California Mechanical, and California Plumbing Codes, and applicable State and local laws and ordinances, and the utility purveyors.
- B. Conflicts, if any, that may exist among the above items, will be resolved at the discretion of the Engineer.
- C. Wherever the requirements of the Specifications or Drawings exceed those of the items above, the requirements of the Specifications or Drawings shall govern.

1.3 INCORPORATED DOCUMENTS

- A. These General Provisions apply to Specification Division 22.
- B. Published Specifications, standards, tests or recommended methods of trade, industry or governmental organizations apply to work of this Section, including those noted below:
 - 1. American National Standards Institute (ANSI).
 - 2. American Society of Mechanical Engineers (ASME).
 - 3. American Society for Testing and Materials (ASTM).
 - 4. National Electrical Manufacturers Association (NEMA).
 - 5. National Fire Protection Association (NFPA).
 - 6. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - 7. Underwriters' Laboratories, Inc. (UL).

1.4 LEGAL REQUIREMENTS AND STANDARDS

- A. General: Comply with applicable sections of state and local codes, laws, ordinances, rules, and regulations of authorities having jurisdiction.
- B. Codes and Standards: Conform to applicable sections of codes and standards, including:
 - 1. California Energy Code (CEC); Title 24.
 - 2. Occupational Safety and Health Administration (OSHA).
 - 3. State Fire Marshal requirements.
 - 4. National Electric Code (NEC).
 - 5. California Plumbing Code (CPC).
 - 6. California Structural Code (CSC).
 - 7. California Mechanical Code (CMC).
 - 8. California Fire Code.
- C. Minimum Requirements:
 - 1. Comply with requirements of authorities as minimum acceptable work.
 - 2. The Drawings and Specifications take precedence when they call for materials or construction of better quality or larger size than required by codes, laws, rules, and regulations.

3. The Drawings take precedence over Specifications when a conflict between the Drawings and Specifications arise. Written and approved changes take precedence over the original Drawing.

1.5 QUALITY ASSURANCE

A. Products Criteria:

1. Supply all equipment and accessories new, free from defects.
2. Supply all equipment and accessories in compliance with the applicable standards listed in this Section and with all applicable national, state, and local codes.
3. Electrical Equipment: Listed by UL and shall bear their label.
4. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See "other Specification Sections" for any exceptions.
5. Equipment Service: Products shall be supported by a service organization which maintains a complete inventory of repair parts and is located reasonably close to the site.
6. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
7. Assembled Units: Manufacturers of equipment assemblies which use components made by others assume complete responsibility for the final assembled product.
8. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment stamped or otherwise permanently marked on each item of equipment.
9. Asbestos products or equipment or materials containing asbestos shall not be used.
10. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the "Engineer" prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received and approved by the "Engineer." Failure to furnish these recommendations can be cause for rejection of the material.

- B. Qualifications of Contractor: For the actual fabrication, installation, and testing of work under this Section, use only thoroughly trained and experienced workmen completely familiar with the items required and the manufacturer's current recommended methods of installation. Workmen shall have at least 3 years of experience with manufacturer's methods of installation. Contractor shall have a valid applicable California State Contractor's License for the work to be performed.

C. Requirements of Regulatory Agencies and Standards:

1. Permits: Obtain and pay for all fees, permits, and inspections. Deliver all certificates of inspection to the Engineer.
2. Legal Requirements: Comply with applicable sections of state and local codes, ordinances, and rules and regulations of authorities having jurisdictions.
3. Minimum Requirements: The requirements of authorities shall be the minimum acceptable requirements for the work. When Contract Drawings or Specifications call for materials or construction of better quality or larger size than required by codes, laws, and/or rules and regulations, the Drawings and Specifications take precedence.
4. Service Connections: Arrange and pay all costs for utilities required to complete all work of this Division. Connection to all utility company or on-site services, payment of service charges, and provision for and installation of temporary utilities is included.

1.6 SITE EXAMINATION

- A. Examine site and existing conditions carefully and compare to the plumbing, electrical, architectural, structural, civil, and other Drawings. Call any discrepancies to the attention of the Engineer during the bidding period. Make allowances for them in preparing the bid.

- B. Drawings
 - 1. All scaled and figured dimensions are approximate and are given for estimate purposes only. Before proceeding with any work, carefully check and verify all dimensions, sizes, etc.

1.7 ELECTRICAL WORK

- A. Quality: Work shall comply with requirements of Division 26.
- B. Wiring: All wiring shall be in electrical conduit or as indicated on the Drawings.

1.8 SUBSTITUTION OF MATERIALS

- A. Equals: The design has been based on the manufacturer's name and product listed on the Drawings or named in these Specifications. Other manufacturers' names listed in these Specifications may be selected and considered "as equal" for quality only; however, they must match the performance, construction, fit, and features of those selected for design. The acceptance of these alternates does not relieve the Contractor of responsibility for providing the required materials and providing a workable system.
- B. Should the Contractor wish to substitute equipment or material to other than those considered for the basis of design, the Contractor shall submit information in sufficient detail to allow the Engineer to make a complete evaluation. The submittals shall show that the substitute material is equivalent in quality, performance, construction, fit, and features of the specified material. Any equipment or material submitted for substitution without sufficient information will not be reviewed or acceptable. Substitution submittals shall be indicated as such. No substitute equipment or material shall be used until approved in writing by the Engineer.
- C. Liability of Substitutions:
 - 1. Performance of substitutions must be equal to the item specified. Should the substituted item fail to perform according to Specifications, replace with the originally specified item without extra compensation on request of the Engineer any time within the guarantee period.
 - 2. The Contractor is responsible for the cost of any changes to other trades and additional architectural and consulting fees resulting from substitutions in plumbing equipment.
 - 3. Unless otherwise directed in writing, six copies of each submittal shall be submitted. One signed approved copy shall be returned to the Contractor. Three copies will be returned if the submittal is not approved.

1.9 OPERATIONS AND MAINTENANCE DATA

- A. The Contractor shall provide operations and maintenance data for all equipment furnished for the project. The data shall be compiled into multiple three-ring binders.

1.10 JOB CONDITIONS

- A. Interruption of Services:
 - 1. Before making any connections or doing any work which interrupts services to existing buildings, notify Owner in writing at least 72 hours in advance. After receiving approval, perform said work as quickly as possible and only at such times as designated by Owner.
 - 2. Length of time existing services are shut down shall be pre-approved by Owner.
- B. Restoration of Damage: Repair or replace, as directed by Engineer, materials and parts of premises which become damaged because of installation of work in this Division. Remove replaced parts and/or damaged material from premises at no expense to the Owner.

C. Cleaning Equipment and Premises:

1. Clean equipment and materials: Remove all dirt, grease, splashed paint, plaster, and similar foreign materials. Restore damaged finishes to original condition.
2. Site Cleaning: Remove from site and properly dispose of all packing cartons, scrap materials, and other rubbish resulting from the construction.
3. The jobsite shall be maintained in a safe working condition at all times. Walk areas shall be free from any safety hazard at all times. If directed by the Owner, Contractor shall clean up work area on a daily basis.

1.11 DAMAGE BY LEAKS

- A. Be responsible for damage to any part of the premises caused by leaks in the piping or fixtures or equipment installed under applicable Section for the period of 12 months from the date of acceptance of the work done by the Owner.

1.12 SUBMITTALS

A. General:

1. At a minimum, provide six complete hardcopy submittals as specified herein and as required to completely describe the equipment and systems being provided.
2. In addition to the schedule requirements herein, the Contractor is responsible for providing submittals in a timely manner as required to meet the overall project schedule.
3. Should any item which deviates from these Specifications be included, the deviation shall be clearly indicated and explained at the time of submittal.
4. Submittals shall be complete, neat, orderly, and indexed. The Contractor shall check submittals for number of copies, adequate identification, correctness, and compliance with the Drawings and Specifications, and shall initial all copies.
5. Revise and resubmit all submittal information until acceptable to the Engineer.
6. Review of submittal information by the Engineer shall not relieve the Contractor of responsibility for meeting the requirements of the Drawings and Specifications or for errors and omissions in submittals.

B. Product Submittals:

1. Product submittals shall be submitted within 45 days after the Notice to Proceed. In addition, no products shall be fabricated or shipped until the applicable submittals have been favorably reviewed by the Engineer.
2. As-built copies of product submittals shall be included in the O&M manuals.
3. Before any material is fabricated or shipped, furnish to the Engineer full details, shop drawings, dimensions, catalog cuts, and other descriptive matter as required to fully describe the equipment specified under this Section.

1.13 WARRANTY

- A. The work and materials covered in this Section shall be guaranteed for a period of 1 year from the date of acceptance thereof against defective materials, design, and workmanship.

1.14 FIRE PROTECTION

- A. See architectural documents for fire-stopping requirements, and comply with State Fire Marshal requirements for approved and listed fire-stopping systems. See architectural drawings for fire-stop finish details. At a minimum, penetration of fire-rated walls, floor-ceilings, and roof-ceilings shall meet California Structural Code requirements.

1.15 STRUCTURAL ENGINEERING

- A. All installations shall meet requirements of the applicable seismic load.

- B. Provide details and calculations for equipment supports, seismic restraints, and attachments to the building structure. Design and calculations shall be prepared by a structural engineer registered in the State of California. Include mounting provisions which are as recommended by manufacturers, at a minimum, and add provisions as required to meet structural requirements per California Structural Code Seismic Guidelines and in accordance with the latest edition of SMACNA Seismic Restraint Guidelines.

PART 2 – PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Materials and equipment for this project is as specified in the individual sections.

PART 3 – EXECUTION

3.1 REVIEW OF CONSTRUCTION

- A. Work may be reviewed any time by a representative of the Engineer.
- B. Advise Engineer that work is ready for review at following times:
 - 1. Prior to backfilling buried work.
 - 2. Before concealment of work in walls and above ceilings.
 - 3. When requirements of Contract have been completed.
- C. Do not conceal work without Engineer's consent.
- D. Maintain on project site a set of Specifications and Drawings for use by Engineer's representative.
- E. Noncompliance: Should any of the work be covered up or concealed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer at no additional cost to the Owner.

3.2 GENERAL INSTALLATION METHODS

- A. Carpentry, Cutting, Patching, and Core Drilling:
 - 1. Provide carpentry, cutting, patching, and core drilling required for installation of material and equipment specified in this Division.
 - 2. Do not cut, core, or drill structural members without consent of Engineer.
- B. Waterproof Construction:
 - 1. Maintain waterproof integrity of penetration of materials intended to be waterproof. Caulk and seal penetrations of foundation walls and floors watertight. Provide membrane clamps at penetrations of waterproof membranes.
 - 2. Provide weatherproof NEMA 3R enclosures for all equipment or devices mounted outside or otherwise exposed to the weather.
- C. Sleeves, Chases, and Concrete Inserts:
 - 1. Provide all required sleeves, chases, concrete inserts, anchor bolts, etc., and be responsible for correct location, installation of same.
 - 2. Sleeves and chases are prohibited in structural members, except where approved in writing by the Engineer.
 - 3. Provide sleeves with free stop for each pipe passing through walls, partitions, floors, and roofs.

4. Set all pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.
5. Locate all chases, shafts, and openings required for the installation of the plumbing work during framing of the structure. Provide any additional cutting and boring required due to improperly located or omitted openings without cost to the Owner under the supervision of the Engineer.
6. Sleeves for uninsulated pipe shall be two pipe sizes larger than pipe passing through or a minimum of 1/2" clearance between inside of sleeve and outside of pipe.
7. Sleeves for insulated piping shall be of adequate size to accommodate the full thickness of pipe covering with clearance for packing and caulking.
8. Caulk space between sleeve and pipe or pipe covering with an incombustible, permanently plastic, waterproof non-staining compound leaving a finished smooth appearance, or pack with incombustible fibrous glass to within 1/2" of both wall faces and provide plastic, waterproof caulking compound.
9. Finish and Plates: Smooth up rough edges around sleeve with plaster.

3.3 EXCAVATING AND BACKFILLING

- A. Safety Requirements: Do all shoring and pumping necessary to protect excavation and safety of workmen. Comply with all safety requirements of all applicable authorities. Protect excavations with barricades as required by applicable safety regulations.
- B. Excavation: Perform trenching, shoring, and backfilling required for proper laying of pipes. Cut bottom of trenches to grade of pipe. Excavate bell holes. Provide bearing for entire length of lower third of pipe. Excavate rock and install 2 inches of pea gravel, well tamped. Trenches shall be at least 12" wider than greatest diameter of pipe. Provide drainage rock, Class II, under irrigation piping under building slabs.
- C. Backfilling: Place and compact as specified. Cover no work until installation has been approved by the Engineer. Provide 36" minimum cover for cast iron and steel pipe outside building. Remove surplus materials as directed and dispose of properly.

3.4 IDENTIFICATION OF VALVES

- A. Provide a typewritten chart assembled in a three ring binder showing the valve numbers together with their locations and use.

3.5 PROTECTION, CARE, AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until final completion.
- B. During construction, properly cap all lines and equipment nozzles so as to prevent the entrance of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. After installation has been completed, clean all systems. All pipe must be free of dirt, grease, and the like. All pipe systems shall be flushed at 1.5 times system velocity for a minimum of 8 hours.
- D. Piping and Equipment to be Painted: Clean exterior of piping and equipment, where exposed in completed structure by removing rust, plaster cement, and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Touch up primer coat as required. Finish paint where directed by Engineer per color and type as directed.

3.6 SEISMIC REQUIREMENTS

- A. Installation of products provided under this Section shall meet the applicable seismic requirements of the following:
 - 1. California Structural Code
- B. Calculations signed by a registered engineer are required under the Article, SUBMITTALS. Equipment installation shall meet or exceed the requirements defined by those calculations.
- C. In addition, installations shall meet any applicable seismic requirements covered elsewhere in these Contract Documents.

3.7 COMPLETION

- A. Before Final Review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Valve Directories, Piping Identification Code Directory, and nameplate data specified herein have been approved and properly posted in the building and final cleaning has been completed.
- B. Demonstration of Operations: When the installation is complete and adjustments specified herein have been made, operate the systems for a period of 1 week, during which time demonstrate to the Engineer that systems are completed and operating in conformance with these Specifications.

3.8 CLEANING AND TOUCHUP PAINTING

- A. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner.

3.9 INSTALLATIONS

- A. Locations of plumbing equipment shown on Drawings are approximate unless dimensioned. Check for and resolve conflicts with openings, structural members, and equipment having fixed locations. Coordinate among trades.
- B. Do not cut or notch any structural member or building surface without specific approval of the Engineer. Carefully carry out any cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, paving, or other surfaces required for the installation, support, or anchorage of equipment. Following such work, restore surfaces neatly to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner. Any penetrations to fire rated materials shall be restored to equal rating or as required by the State Fire Marshal.
- C. Follow manufacturer's installation instructions explicitly, unless otherwise indicated.
 - 1. It is prohibited to pass plumbing through special equipment control rooms, such as security and access control rooms, electrical rooms, computer server, and/or data process equipment rooms.
 - 2. It is permitted to pass a single dedicated building plumbing into special equipment control rooms, such as security and access control rooms, electrical rooms, computer server, and data process equipment rooms, if that single dedicated building service branch serves only that room.
 - 3. Plumbing shall not be installed above electrical equipment. Required clear space is as follows:
 - a. Vertical

- (1) From floor below panel to the floor or roof above panel.
 - b. Horizontal
 - (1) Equipment width plus 6 inches each side, 30 inches minimum.
 - 4. Installations shall allow for required reading, inspections, and service.
 - D. Clearance separations are required between piping, conduit, equipment, and the facility itself. Installations shall meet all applicable clearance requirements stated in NFPA 70 (National Electrical Code), Article 110.
 - E. Roof Penetrations
 - 1. All roof penetrations shall be watertight.
 - 2. Plumbing and/or flue vents through the roof shall meet California Mechanical and Plumbing Code Requirements.
 - 3. Provide and install ventilated weatherproof flue vent caps.
 - F. Supports
 - 1. Provide vibration isolation with seismic restraints and seismic snubbers on all rotating or vibrating equipment.
 - 2. All piping shall be installed so there is no direct contact with structure. Provide and install neoprene spacers around piping in walls.
 - G. Finish Work
 - 1. Set plumbing equipment in proper level and alignment, per equipment manufacturers' specified tolerances.
 - 2. Equipment and piping shall be lined up with the column lines of the building and/or adjacent walls, floors, and other architectural features such as equipment screen walls.
 - H. Completed work shall present a neat and finished appearance. Furnish and install incidental items not specifically shown or required by good practice to provide a complete system.
- 3.10 STARTUP
- A. All equipment shall be wired, set, inspected, and lubricated per manufacturer's instructions.
 - B. Prior to startup of any equipment, all trades shall confirm that all equipment is completely installed.
 - C. Confirm that overcurrent devices are appropriate, starter overload sizes are correct, and disconnect and fuse sizes are correct for safe operation of the equipment. All belt guards, electrical covers, and other safety equipment shall be installed.
- 3.11 TESTING, ADJUSTING, AND BALANCING
- A. Perform Work in accordance with AABC MN-1 National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
 - B. Prior to commencing Work, calibrate each instrument to be used.
 - C. Test and Balance Engineer's Qualifications: A Professional Engineer (either on the installer's staff or an independent consultant), registered in the State in which the services are to be performed, and having at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

- D. Agency Qualifications:
1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design and recording and reporting the results.
 2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by NEBB or AABC as a Test and Balance Engineer.
- E. Verify systems are complete and operable before commencing work. Verify the following:
1. Systems are started and operating in safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Pumps are rotating correctly.
 5. Proper strainer baskets are clean and in place or in normal position.
 6. Service and balancing valves are open.
- F. Furnish instruments required for testing, adjusting, and balancing operations.
- G. Adjusting:
1. Verify recorded data represents actual measured or observed conditions.
 2. Permanently mark settings of valves and other adjustment devices allowing settings to be restored.
 3. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
 4. Report defects and deficiencies noted during performance of services, preventing system balance.
 5. Leave systems in proper working order.
- H. Water System Procedure:
1. Adjust the domestic hot water heating and recirculation systems to obtain design quantities.
 2. Use calibrated fittings and pressure gauges to determine flow rates for system balance.

3. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
 - I. Equipment Requiring Testing, Adjusting, and Balancing:
 1. Domestic water heaters.
 2. Hot water recirculation system.
 - J. Comply with testing, adjusting, and reporting as required in the 2013 California Green Building Standards Code Section 5.410.4 through 5.410.4.5.1.
- 3.12 PROJECT CLOSEOUT
- A. At the completion of the project, the Contractor shall:
 1. Submit operation and maintenance manuals, with tab dividers separating specific systems or items of equipment. Equipment warranties shall be included.
 2. Submit a list of recommended spare parts.
 3. Submit marked up "As-Built" drawings with final installed arrangements, including equipment model numbers and performance data.

END OF SECTION

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Gate valves.
 - 2. Ball valves.
 - 3. Check valves.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 - 2. ASTM D4101 - Standard Specification for Propylene Injection and Extrusion Materials.
- B. Manufacturer's Standardization Society Of The Valve And Fittings Industry:
 - 1. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
 - 2. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - 3. MSS SP 80 – Bronze Gate, Globe, Angle, and Check Valves.
 - 4. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

- A. Refer to Section 220000 for Submittal requirements.
- B. Submit manufacturer's catalog information with valve data and ratings for each service.
- C. Submit hanging and support methods, joining procedures.

1.4 CLOSEOUT SUBMITTALS

- A. Record actual locations of valves on as-built Drawings.
- B. Submit installation instructions, spare parts lists, exploded assembly views.

PART 2 – PRODUCTS

- 2.1 Manufacturers, or equal:
 - 1. Crane.
 - 2. Apollo.
 - 3. Milwaukee.
 - 4. NIBCO.
 - 5. Stockham.
 - 6. Watts.
 - 7. Jamesbury.
 - 8. Bell & Gossett.
 - 9. Mueller.

2.2 VALVE FEATURES, GENERAL

- A. Pressure And Temperature Ratings shall be as required to meet system pressures and temperatures.
- B. Sizes: Same size as upstream pipe, unless otherwise indicated.
- C. End Connections: As indicated in the valve specifications.
 - 1. Threads: Comply with ANSI B1.20.1.
 - 2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
 - 3. Solder-Joint: Comply with ANSI B16.18.
 - 4. Caution: Where soldered end connections are used, use solder having a melting point below 840 degrees F for gate and check valves; below 421 degrees F for ball valves.

2.3 GATE VALVES

- A. 2 Inches And Smaller: MSS SP 80, Class 125, bronze body, bronze trim, threaded bonnet, inside screw, solid wedge disk, alloy seat rings, solder or threaded ends.

2.4 BALL VALVES

- A. 2 Inches And Smaller: MSS SP 110, Class 150, bronze, two-piece body, chrome-plated bronze ball, full port, Teflon seats, blowout-proof stem, solder or threaded ends, lever handle.

2.5 CHECK VALVES

- A. Horizontal Swing Check Valves:
 - 1. 2 Inches And Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disk, solder or threaded ends.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify piping system is ready for valve installation.

3.2 INSTALLATION

- A. Install valves with stems upright or horizontal, not inverted.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install 3/4-inch ball valves with cap for drains at main shutoff valves, low points of piping, bases of vertical risers, and at equipment.
- D. Install valves with clearance for installation of insulation and allowing access.
- E. Provide access where valves and fittings are not accessible.
- F. Refer to Section, HANGERS AND SUPPORTS FOR PLUMBING, PIPING, AND EQUIPMENT for pipe hangers.
- G. Refer to Section, PLUMBING INSULATION for insulation requirements for valves.

- H. Refer to Section, WATER AND GAS PIPING for piping materials applying to various system types.

3.3 VALVE APPLICATIONS

- A. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.
- B. Install ball valves for shutoff and to isolate equipment, part of systems, or vertical risers.
- C. Install ball valves for throttling, bypass, or manual flow control services.
- D. Install spring-loaded check valves on discharge of water pumps.
- E. Install ball valves in domestic water systems for shutoff service.
- F. Install ball valves in domestic water systems for throttling service.
- G. Install ball valves in sanitary systems for shutoff service.
- H. Install ball valves in gas systems for shutoff service.

3.4 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

VALVES:

<u>SERVICE</u>	<u>GATE</u>	<u>BALL</u>	<u>CHECK</u>
Domestic Hot and Cold Water	125	150	125

END OF SECTION

SECTION 22 07 19 - PIPE INSULATION

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers pipe insulation. Provisions of Section 22 00 00 apply to this Section.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Beyond material and equipment specified, the Contractor shall provide incidental materials required to effect complete installation. Such incidental materials include solders, tapes, caulking, mastic, oil and lubricants, filters, gaskets, and similar items.
- B. Materials and equipment shall be uniform throughout the installation. Equipment of the same type shall be of same manufacturer.

2.2 PIPE INSULATION

- A. All hot water piping, for water temperatures ranging from 105°F to 140°F, shall be insulated as follows:

<u>Pipe Diameter</u>	<u>Insulation Thickness</u>	<u>Conductivity (Btu-Inch Per Hour Per Square Foot) Per °F</u>
<1"	1.0"	0.22-0.28
1" to <1.5"	1.5"	0.22-0.28
1.5" to <4"	1.5"	0.22-0.28

- B. All cold water piping shall be insulated with ½-inch insulation on pipe installed above grade within the building for condensation control.
- C. Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind including, but not limited to, the following:
- D. Insulation exposed to weather shall be suitable for outdoor service; e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.

2.3 IDENTIFICATIONS

- A. Piping:
1. Identify all piping with Brady Perma-Code, Stenton, or approved equal, self-sticking pipe markers consisting of pipe content wording and arrow indicating directions of flow on A.S.A. color background.
 2. The arrow and wording are two separate markers which shall be placed immediately adjacent to each other.
 3. The markers shall be no greater than 30 feet apart (maximum) on centers and shall occur within 5 feet of where a pipe enters and leaves a concealed space.
 4. Use 2" high letter size on pipe or insulation 3" diameter or larger, and 1" size on pipe or insulation 2-1/2" or smaller.
 5. Provide at each end of each marker 2-1/4" wide self-sticking clear tape around the periphery of pipe or insulation to further secure the marker.

6. All markers shall be installed after finish painting is complete.

PART 3 – EXECUTION

3.1 REVIEW OF CONSTRUCTION

- A. Work may be reviewed any time by a representative of Engineer.
- B. Do not conceal work without Engineer's consent.
- C. Maintain on project site a set of Specifications and Drawings for use by Engineer's representative.
- D. Noncompliance: Should any of the work be covered up or concealed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer at no additional cost to the Owner.

3.2 COMPLETION

- A. Before Final Review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Valve Directories, Piping Identification Code Directory, and nameplate data specified herein have been approved and properly posted in the building and final cleaning has been completed.
- B. Demonstration of Operations: When the installation is complete and adjustments specified herein have been made, operate the systems for a period of 1 week, during which time demonstrate to the Engineer that systems are completed and operating in conformance with these Specifications.

3.3 CLEANING AND TOUCHUP PAINTING

- A. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner.

3.4 INSTALLATIONS

- A. Locations of equipment shown on Drawings are approximate unless dimensioned. Check for and resolve conflicts with openings, structural members, and equipment having fixed locations. Coordinate among trades.
- B. Follow manufacturer's installation instructions explicitly, unless otherwise indicated.

3.5 STARTUP

- A. Prior to startup of any equipment, all trades shall confirm that all equipment is completely installed.

END OF SECTION

SECTION 22 11 00 - WATER AND GAS PIPING

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers water and gas piping. Provisions of Section 220000 apply.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Beyond material and equipment specified, the Contractor shall provide incidental materials required to effect complete installation. Such incidental materials include solders, tapes, caulking, mastic, oil and lubricants, filters, gaskets, and similar items.
- B. Materials and equipment shall be uniform throughout the installation. Equipment of the same type shall be of same manufacturer.

2.2 WATER PIPING

- A. Type L copper tubing may be used for water piping when piping is above ground. Type K copper tubing shall be used for water piping when pipe is below ground.

2.3 GAS PIPING

- A. Gas piping shall be Schedule 40 wrought steel pipe. Gas piping installed underground shall be Schedule 40 galvanized wrought steel pipe.

2.4 PIPE HANGERS AND SUPPORTS

- A. Properly support all materials, equipment, and apparatus. All hangers and supports shall have a minimum safety factor of five (5), based on ultimate tensile or compressive strength, as applicable, of material used. Provide bracing to prevent lateral motion of suspended materials.
- B. Trapeze suspension (trapeze hangers may be used for parallel lines if pipes pitch in the same direction). Size of channel assembly shall be in accordance with manufacturer's published load ratings. No deflections shall exceed 1/360 of span (refer to Superstrut® load tables.)
- C. Support and laterally brace all ducts, pipes, and equipment per latest SMACNA Manual standards.
- D. Do not support weight of piping from mechanical equipment; i.e., pipes, conduits, coil connections, etc.
- E. Do not cut, tack, or weld to any structural steel without permission of Engineer.
- F. Provide Semco, Trisolator, or equal, pipe isolator at all hangers for non-insulated pipes.
- G. Schedule of Hangers and Supports:

1. Individual Pipe Hangers:

<u>Pipe Size</u>	<u>Hanger</u>	<u>Minimum Rod</u>	<u>Manufacturer</u>
1/2" through 1"	AWWA Clevis	3/8"	Superstrut® or equal
2" through 3"	AWWA Clevis	1/2"	Superstrut® or equal

4"	AWWA Clevis	5/8"	Superstrut® or equal
6" through 8"	AWWA Clevis	3/4"	Superstrut® or equal
10" through 12"	AWWA Clevis	7/8"	Superstrut® or equal

2. Trapeze Hangers:

Single or Double 12 Gauge Channel:

Superstrut® A1200 or A1202, or equal

Straps:

Superstrut® 701 or 702 series, or equal

Pipe Isolators:

Superstrut® A716 Cash-A-Clamp, or equal

3. Wall Support:

Individual Pipe Sizes Up To 3":

Superstrut® S250 Series, or equal

Individual Pipe Sizes 4" to 8":

Superstrut® S251 Series, or equal

2.5 ROOF, WALL, AND FLOOR PENETRATIONS

- A. All pipe penetration holes shall be sealed with a product that will seal against the spread of flame, smoke, gasses, and water for up to a 3-hour rating. Product shall be as manufactured by 3M Brand (Fire Barrier Penetration Sealing Systems) or equal. Product must have been tested and classified by Underwriters' Laboratories and listed in the UL Building Materials Directory; "Through-Penetration Fire Stop Systems (XHEZ)," and "Fill, Void or Cavity Materials (XHHW)." Submittal shall include product and manufacturer's Spec-Data sheet reflecting UL approvals.

- B. Provide pipe sleeves as follows:

Sleeve Location

Sleeve Material

Walls and partitions

#18 gauge, galvanized sheet metal.

Roof and floor membrane,

Cast iron body with floor and roof

waterproof construction flashing device, under deck clamp as required.

Non-membrane floor

Standard weight black steel pipe with a continuously welded water stop of 1/4" steel plate extending from outside of sleeve a minimum of 2" all around.

- C. Length of sleeves as follows:

Location

Sleeve Length

Floors

Sleeve length shall be equal to depth of floor construction including finish. Except in unfinished areas and in pipe chases, extend the sleeve a minimum of 2" above floor level. Sleeve shall be equal to depth of roof construction.

Roofs

Wall and Partitions

Extend sleeve a minimum of 2" either side of wall.

- D. Escutcheons: Provide 1" wide chrome or nickel plated plates on all pipes exposed to view, passing through the floors, walls, partitions, etc. Escutcheons shall be sized to fit pipe and pipe covering and give a finished appearance. Escutcheons shall be held in place by set screws. Provide plates on pipes extending through sleeves.

2.6 IDENTIFICATIONS

- A. Piping:

1. Identify all piping with Brady Perma-Code, Stenton, or approved equal, self-sticking pipe markers consisting of pipe content wording and arrow indicating directions of flow on A.S.A. color background.
2. The arrow and wording are two separate markers which shall be placed immediately adjacent to each other.

3. The markers shall be no greater than 30 feet apart (maximum) on centers and shall occur within 5 feet of where a pipe enters and leaves a concealed space.
4. Use 2" high letter size on pipe or insulation 3" diameter or larger, and 1" size on pipe or insulation 2-1/2" or smaller.
5. Provide at each end of each marker 2-1/4" wide self-sticking clear tape around the periphery of pipe or insulation to further secure the marker.
6. All markers shall be installed after finish painting is complete.

- B. Valves: All valves shall have 1-1/2" diameter brass disc stamped with 1/2" high letters showing type of services and valve number. The tags shall be attached to valves with brass chain.

2.7 ACCESS PANELS AND ACCESS WAYS

- A. Provide and install stainless steel access panels, access panel frames, and all required blocking and supports for access panels to meet the Oregon Structural Specialty Code "minimum access requirements."
- B. Access-way, which the Oregon Structural Specialty Code refers to as the path to portions of mechanical equipment needing adjustment and/or service, shall also meet Oregon Structural Specialty Code requirements.

2.8 SEISMIC REQUIREMENTS

- A. Design and fabrication of products provided under this Section shall be suitable for installation in locations which meet the applicable seismic requirements specified in this Specification.

PART 3 – EXECUTION

3.1 REVIEW OF CONSTRUCTION

- A. Work may be reviewed any time by a representative of Engineer.
- B. Do not conceal work without Engineer's consent.
- C. Maintain on project site a set of Specifications and Drawings for use by Engineer's representative.
- D. Noncompliance: Should any of the work be covered up or concealed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer at no additional cost to the Owner.

3.2 GENERAL INSTALLATION METHODS

- A. Carpentry, Cutting, Patching, and Core Drilling:
1. Provide carpentry, cutting, patching, and core drilling required for installation of material and equipment specified in this Division.
 2. Do not cut, core, or drill structural members without consent of Engineer.
- B. Waterproof Construction:
1. Maintain waterproof integrity of penetration of materials intended to be waterproof. Caulk and seal penetrations of foundation walls and floors watertight. Provide membrane clamps at penetrations of waterproof membranes.
 2. Provide weatherproof NEMA 3R enclosures for all equipment or devices mounted outside or otherwise exposed to the weather.

- C. Sleeves, Chases, and Concrete Inserts:
1. Provide all required sleeves, chases, concrete inserts, anchor bolts, etc., and be responsible for correct location, installation of same.
 2. Sleeves and chases are prohibited in structural members, except where approved in writing by the Engineer.
 3. Provide sleeves with free stop for each pipe passing through walls, partitions, floors, and roofs.
 4. Set all pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.
 5. Locate all chases, shafts, and openings required for the installation of the mechanical work during framing of the structure. Provide any additional cutting and boring required due to improperly located or omitted openings without cost to the Owner under the supervision of the Engineer.
 6. Sleeves for uninsulated pipe shall be two pipe sizes larger than pipe passing through or a minimum of 1/2" clearance between inside of sleeve and outside of pipe.
 7. Sleeves for insulated piping shall be of adequate size to accommodate the full thickness of pipe covering with clearance for packing and caulking.
 8. Caulk space between sleeve and pipe or pipe covering with an incombustible, permanently plastic, waterproof non-staining compound leaving a finished smooth appearance, or pack with incombustible fibrous glass to within 1/2" of both wall faces and provide plastic, waterproof caulking compound.
 9. Finish and Plates: Smooth up rough edges around sleeve with plaster.

3.3 EXCAVATING AND BACKFILLING

- A. Safety Requirements: Do all shoring and pumping necessary to protect excavation and safety of workmen. Comply with all safety requirements of all applicable authorities. Protect excavations with barricades as required by applicable safety regulations.
- B. Excavation: Perform trenching, shoring, and backfilling required for proper laying of pipes. Cut bottom of trenches to grade of pipe. Excavate bell holes. Provide bearing for entire length of lower third of pipe. Excavate rock and install 2 inches of pea gravel, well tamped. Trenches shall be at least 12" wider than greatest diameter of pipe. Provide drainage rock, Class II, under irrigation piping under building slabs.
- C. Backfilling: Place and compact as specified under Section 2. Cover no work until installation has been approved by the Engineer. Provide 36" minimum cover for cast iron and steel pipe outside building. Remove surplus materials as directed and dispose of properly.

3.4 INSTALLATION OF PIPING

- A. Conceal all piping within finished rooms, unless otherwise noted on Drawings.
- B. Cut pipe accurately to measurements established at the worksite; work into place without springing or forcing; and properly clear all windows, doors, and other openings. Any cutting or other weakening of the building structure to facilitate piping installation will not be permitted.
- C. Make all changes in pipe direction with fittings and changes in main sizes through eccentric reducing fittings. Unless otherwise noted, install water supply and return piping with straight side of eccentric fittings at top of pipe.
- D. Provide sufficient swing joints, ball joints, expansion loops, and devices necessary for a flexible piping system. Anchor piping systems so as to control expansion and movement where designed.

- E. Provide isolating valves on piping at all equipment or apparatus. Locate valves so that the equipment can be removed without dismantling any branch lines.
- F. Install drain valves at all low points of each system to enable complete drainage, and air vents at all high points in the piping system to enable complete air venting. Install automatic air vent at all high points in the main piping systems.
- G. Pitch the slope pipe as required for proper drainage and elimination of air.
- H. Wire shall not be used for hanging or strapping pipes.
- I. Support each run of piping independently from all other piping.
- J. Equipment Access:
 - 1. Install all piping, equipment, and accessories to permit access for maintenance. Relocate piping, equipment, and accessories required to provide maintenance access at no additional cost.
 - 2. Furnish access doors where any valves, sprinkler system components, and equipment requires access for servicing, repairs, or maintenance in walls, chases, or above ceilings. Coordinate the location of access doors with and install by the applicable Contractor installing walls or ceilings.
- K. Install gauges, valves, and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

3.5 PIPE JOINTS

- A. Welded Piping:
 - 1. Make welds in an expert, workmanlike manner by welders experienced in piping work. Welders used in the work are to be certified as having qualified within the preceding 6 months in accordance with AWS standard qualification procedures. Certification paperwork to be on file prior to beginning of the work.
 - 2. Grind out all welds with cracks, blow holes, porosities, or other defects and replace at no additional cost to the Owner. On lightweight piping, extreme care must be taken to prevent burning holes through the piping material. Piping with any such holes must be removed and replaced.
- B. Threaded Piping:
 - 1. Cut pipe to be threaded with a machine cutter, a hand pipe cutter, or Carborundum pipe wheel. Debur with file or scraper or pipe reamer. Do not ream to exceed I.D. of pipe. Threading shall be to ANSI B2.1 requirements.
 - 2. Use Teflon tape on male thread prior to joining other services. No more than two full threads shall remain exposed after joining.
- C. Copper Tubing:
 - 1. Cut copper tubing square, remove burs, and clean pipe and inside of female fitting to a bright finish with steel wool, wire brush, sandpaper, or emery cloths. Apply solder flux with brush to tubing. Remove internal parts of solder-end valves prior to soldering.

3.6 IDENTIFICATION OF VALVES

- A. Provide a typewritten chart assembled in a three ring binder showing the valve numbers together with their locations and use.

3.7 PROTECTION, CARE, AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until final completion.
- B. During construction, properly cap all lines and equipment nozzles so as to prevent the entrance of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. After installation has been completed, clean all systems. All pipe must be free of dirt, grease, and the like. All pipe systems shall be flushed at 1.5 times system velocity for a minimum of 8 hours.
- D. Piping and Equipment to be Painted: Clean exterior of piping, ductwork, and equipment, where exposed in completed structure by removing rust, plaster cement, and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Touch up primer coat as required. Finish paint where directed by Engineer per color and type as directed.

3.8 COMPLETION

- A. Before Final Review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Valve Directories, Piping Identification Code Directory, and nameplate data specified herein have been approved and properly posted in the building and final cleaning has been completed.
- B. Demonstration of Operations: When the installation is complete and adjustments specified herein have been made, operate the systems for a period of 1 week, during which time demonstrate to the Engineer that systems are completed and operating in conformance with these Specifications.

3.9 CLEANING AND TOUCHUP PAINTING

- A. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner.

3.10 INSTALLATIONS

- A. Locations of mechanical equipment shown on Drawings are approximate unless dimensioned. Check for and resolve conflicts with openings, structural members, and equipment having fixed locations. Coordinate among trades.
- B. Follow manufacturer's installation instructions explicitly, unless otherwise indicated.
- C. Clearance separations are required between piping, ductwork, conduit, equipment, and the facility itself. Installations shall meet all applicable clearance requirements stated in NFPA 70 (National Electrical Code), Article 110.
- D. Roof Penetrations
 - 1. All roof penetrations shall be watertight.
- E. Supports
 - 1. All piping shall be installed so there is no direct contact with structure. Provide and

install neoprene spacers around piping in walls.

- F. Completed work shall present a neat and finished appearance. Furnish and install incidental items not specifically shown or required by good practice to provide a complete system.

3.11 STARTUP

- A. All equipment shall be wired, set, and inspected per manufacturer's instructions.
- B. Prior to startup of any equipment, all trades shall confirm that all equipment is completely installed.

END OF SECTION

SECTION 22 13 00 - WASTE/VENT PIPING

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers waste/vent piping. Provisions of Section 22 00 00 apply.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Beyond material and equipment specified, the Contractor shall provide incidental materials required to effect complete installation. Such incidental materials include solders, tapes, caulking, mastic, oil and lubricants, filters, gaskets, and similar items.
- B. Materials and equipment shall be uniform throughout the installation. Equipment of the same type shall be of same manufacturer.

2.2 WASTE PIPING

- A. Drain pipe shall be ABS or PVC DWV pipe.

2.3 VENT PIPING

- A. Vent pipe shall be ABS or PVC DWV pipe.

2.4 PIPE HANGERS AND SUPPORTS

- A. Trapeze suspension (trapeze hangers may be used for parallel lines if pipes pitch in the same direction). Size of channel assembly shall be in accordance with manufacturer's published load ratings. No deflections shall exceed 1/360 of span (refer to Superstrut® load tables.)
- B. Support and laterally brace all ducts, pipes, and equipment per latest SMACNA "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Systems" (the Superstrut® Seismic Restraint System for pipes and conduits only) Manual standards.
- C. Do not support weight of piping from equipment; i.e., pipes, conduits, coil connections, etc.
- D. Do not cut, tack, or weld to any structural steel without permission of Engineer.
- E. Provide Semco, Trisolator, or equal, pipe isolator at all hangers for non-insulated pipes.
- F. Schedule of Hangers and Supports:

1. Individual Pipe Hangers:

<u>Pipe Size</u>	<u>Hanger</u>	<u>Minimum Rod</u>	<u>Manufacturer</u>
1/2" through 1"	AWWA Clevis	3/8"	Superstrut® or equal
2" through 3"	AWWA Clevis	1/2"	Superstrut® or equal
4"	AWWA Clevis	5/8"	Superstrut® or equal
6" through 8"	AWWA Clevis	3/4"	Superstrut® or equal
10" through 12"	AWWA Clevis	7/8"	Superstrut® or equal

2. Trapeze Hangers:

Single or Double 12 Gauge Channel:
Straps:

Superstrut® A1200 or A1202, or equal
Superstrut® 701 or 702 series, or equal

Pipe Isolators:

Superstrut® A716 Cash-A-Clamp, or equal

3. Wall Support:

Individual Pipe Sizes Up To 3":

Superstrut® S250 Series, or equal

Individual Pipe Sizes 4" to 8":

Superstrut® S251 Series, or equal

2.5 ROOF, WALL, AND FLOOR PENETRATIONS

- A. All pipe penetration holes shall be sealed with a product that will seal against the spread of flame, smoke, gasses, and water for up to a 3-hour rating. Product shall be as manufactured by 3M Brand (Fire Barrier Penetration Sealing Systems) or equal. Product must have been tested and classified by Underwriters' Laboratories and listed in the UL Building Materials Directory; "Through-Penetration Fire Stop Systems (XHEZ)," and "Fill, Void or Cavity Materials (XHHW)." Submittal shall include product and manufacturer's Spec-Data sheet reflecting UL approvals.

- B. Provide pipe sleeves as follows:

Location

Walls and partitions

Roof and floor membrane, waterproof

Non-membrane floor

Sleeve Material

#18 gauge, galvanized sheet metal.

Cast iron body with floor and roof construction flashing device, under deck clamp as required.

Standard weight black steel pipe with a continuously welded water stop of 1/4" steel plate extending from outside of sleeve a minimum of 2" all around.

- C. Length of sleeves as follows:

Location

Floors

Roofs

Wall and Partitions

Sleeve Length

Sleeve length shall be equal to depth of floor construction including finish.

Except in unfinished areas and in pipe chases, extend the sleeve a minimum of 2" above floor level.

Sleeve shall be equal to depth of roof construction.

Extend sleeve a minimum of 2" either side of wall.

- D. Escutcheons: Provide 1" wide chrome or nickel plated plates on all pipes exposed to view, passing through the floors, walls, partitions, etc. Escutcheons shall be sized to fit pipe and pipe covering and give a finished appearance. Escutcheons shall be held in place by set screws. Provide plates on pipes extending through sleeves.

2.6 ACCESS PANELS AND ACCESS WAYS

- A. Provide and install stainless steel access panels, access panel frames, and all required blocking and supports for access panels to meet the California Structural Code "minimum access requirements."
- B. Access-way, which the California Structural Code refers to as the path to portions of plumbing equipment needing adjustment and/or service, shall also meet Oregon Structural Specialty Code requirements.

2.7 SEISMIC REQUIREMENTS

- A. Design and fabrication of products provided under this Section shall be suitable for installation in locations which meet the applicable seismic requirements specified in this Specification.

PART 3 – EXECUTION

3.1 REVIEW OF CONSTRUCTION

- A. Work may be reviewed any time by a representative of Engineer.
- B. Do not conceal work without Engineer's consent.
- C. Maintain on project site a set of Specifications and Drawings for use by Engineer's representative.
- D. Noncompliance: Should any of the work be covered up or concealed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer at no additional cost to the Owner.

3.2 GENERAL INSTALLATION METHODS

- A. Carpentry, Cutting, Patching, and Core Drilling:
 - 1. Provide carpentry, cutting, patching, and core drilling required for installation of material and equipment specified in this Division.
 - 2. Do not cut, core, or drill structural members without consent of Engineer.
- B. Waterproof Construction:
 - 1. Maintain waterproof integrity of penetration of materials intended to be waterproof. Caulk and seal penetrations of foundation walls and floors watertight. Provide membrane clamps at penetrations of waterproof membranes.
 - 2. Provide weatherproof NEMA 3R enclosures for all equipment or devices mounted outside or otherwise exposed to the weather.
- C. Sleeves, Chases, and Concrete Inserts:
 - 1. Provide all required sleeves, chases, concrete inserts, anchor bolts, etc., and be responsible for correct location, installation of same.
 - 2. Sleeves and chases are prohibited in structural members, except where approved in writing by the Engineer.
 - 3. Provide sleeves with free stop for each pipe passing through walls, partitions, floors, and roofs.
 - 4. Set all pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.
 - 5. Locate all chases, shafts, and openings required for the installation of the plumbing work during framing of the structure. Provide any additional cutting and boring required due to improperly located or omitted openings without cost to the Owner under the supervision of the Engineer.
 - 6. Sleeves for uninsulated pipe shall be two pipe sizes larger than pipe passing through or a minimum of 1/2" clearance between inside of sleeve and outside of pipe.
 - 7. Caulk space between sleeve and pipe or pipe covering with an incombustible, permanently plastic, waterproof non-staining compound leaving a finished smooth appearance, or pack with incombustible fibrous glass to within 1/2" of both wall faces and provide plastic, waterproof caulking compound.
 - 8. Finish and Plates: Smooth up rough edges around sleeve with plaster.

3.3 EXCAVATING AND BACKFILLING

- A. Safety Requirements: Do all shoring and pumping necessary to protect excavation and safety of workmen. Comply with all safety requirements of all applicable authorities. Protect excavations with barricades as required by applicable safety regulations.
- B. Excavation: Perform trenching, shoring, and backfilling required for proper laying of pipes. Cut bottom of trenches to grade of pipe. Excavate bell holes. Provide bearing for entire length of lower third of pipe. Excavate rock and install 2 inches of pea gravel, well tamped. Trenches shall be at least 12" wider than greatest diameter of pipe. Provide drainage rock, Class II, under irrigation piping under building slabs.
- C. Backfilling: Place and compact as specified under Section 2. Cover no work until installation has been approved by the Engineer. Provide 36" minimum cover for cast iron and steel pipe outside building. Remove surplus materials as directed and dispose of properly.

3.4 INSTALLATION OF PIPING

- A. Conceal all piping within finished rooms, unless otherwise noted on Drawings.
- B. Cut pipe accurately to measurements established at the worksite; work into place without springing or forcing; and properly clear all windows, doors, and other openings. Any cutting or other weakening of the building structure to facilitate piping installation will not be permitted.
- C. Make all changes in pipe direction with fittings and changes in main sizes through eccentric reducing fittings. Unless otherwise noted, install return piping with straight side of eccentric fittings at top of pipe.
- D. Pitch the slope pipe as required for proper drainage and elimination of air.
- E. Wire shall not be used for hanging or strapping pipes.

3.5 PIPE JOINTS

- A. Welded Piping:
 - 1. Make welds in an expert, workmanlike manner by welders experienced in piping work. Welders used in the work are to be certified as having qualified within the preceding 6 months in accordance with AWS standard qualification procedures. Certification paperwork to be on file prior to beginning of the work.
 - 2. Grind out all welds with cracks, blow holes, porosities, or other defects and replace at no additional cost to the Owner. On lightweight piping, extreme care must be taken to prevent burning holes through the piping material. Piping with any such holes must be removed and replaced.
- B. Threaded Piping:
 - 1. Cut pipe to be threaded with a machine cutter, a hand pipe cutter, or Carborundum pipe wheel. Debur with file or scraper or pipe reamer. Do not ream to exceed I.D. of pipe. Threading shall be to ANSI B2.1 requirements.
 - 2. Use Teflon tape on male thread prior to joining other services. No more than two full threads shall remain exposed after joining.

3.6 PROTECTION, CARE, AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until final completion.

- B. During construction, properly cap all lines so as to prevent the entrance of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. After installation has been completed, clean all systems. All pipe must be free of dirt, grease, and the like.
- D. Piping and Equipment to be Painted: Clean exterior of piping where exposed in completed structure by removing rust, plaster cement, and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Touch up primer coat as required. Finish paint where directed by Engineer per color and type as directed.

3.7 COMPLETION

- A. Before Final Review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Valve Directories, Piping Identification Code Directory, and nameplate data specified herein have been approved and properly posted in the building and final cleaning has been completed.

3.8 CLEANING AND TOUCHUP PAINTING

- A. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner.

3.9 INSTALLATIONS

- A. Locations of equipment shown on Drawings are approximate unless dimensioned. Check for and resolve conflicts with openings, structural members, and equipment having fixed locations. Coordinate among trades.
- B. Follow manufacturer's installation instructions explicitly, unless otherwise indicated.
- C. Clearance separations are required between piping, ductwork, conduit, equipment, and the facility itself. Installations shall meet all applicable clearance requirements stated in NFPA 70 (National Electrical Code), Article 110.
- D. Roof Penetrations
 - 1. All roof penetrations shall be watertight.
- E. Completed work shall present a neat and finished appearance. Furnish and install incidental items not specifically shown or required by good practice to provide a complete system.

END OF SECTION

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Equipment installation requirements common to equipment sections.
 - 3. Painting and finishing.
 - 4. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. CPVC: Chlorinated polyvinyl chloride plastic.
 - 2. PE: Polyethylene plastic.
 - 3. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.6 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Solvent Cements for Joining Plastic Piping:
 - 1. CPVC Piping: ASTM F 493.
 - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
- B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
- C. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping free of sags and bends.
- E. Install fittings for changes in direction and branch connections.
- F. Verify final equipment locations for roughing-in.
- G. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.4 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

END OF SECTION 230500

SECTION 23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Isolation mounts.
 - 3. Seismic restraint assemblies.
 - 4. Restraining braces and cables.

1.3 DEFINITIONS AND STANDARDS

- A. Referenced Standards
 - 1. ACSE 7-05: American Society of Civil Engineers / Structural Engineering Institute Standard 7-05, Minimum Design Loads for Buildings and Other Structures.
- B. Design Criteria:
 - 1. Occupancy Category: ASCE 7-05 Occupancy Category designation, Table 1-1
 - 2. Site Classification: ASCE 7-05 Site Classification designation, Table 20.3-1
 - 3. Peak Spectral Response Acceleration (SS): ASCE 7-05 Figure 22-1 – Maximum Considered Earthquake Ground Motion of 0.2s spectral response acceleration, Site Class B
 - 4. Design Spectral Response Acceleration (SDS): ASCE 7-05, Eqs. 11.4-1 and 11.4-3
 - 5. Seismic Design Category: ASCE 7-05 Seismic Design Category designation, Tables 11.6-1 and 11.6-2.
 - 6. Component Importance Factor (IP): ASCE 7-05, Section 13.1.3
- C. Custom Engineered Assembly: Anchorage and seismic restraint assembly, comprised of standard or proprietary components, designed and applied to system by the Seismic Engineer.
- D. Pre-Engineered Assembly: Previously designed anchorage and seismic restraint assembly selected and applied to system by the Seismic Restraint System Engineer.
- E. Seismic Restraint System Engineer: Registered Professional Engineer currently licensed in California as a structural, civil, or mechanical engineer. Responsible for designing, applying, and inspecting pre-engineered seismic restraint assemblies and components in accordance with applicable codes and component manufacturer's published recommendations.
- F. Seismic Engineer: Professional engineer currently licensed in California as a structural, civil, or mechanical engineer. Responsible for designing, applying, and inspecting custom seismic restraint components in accordance with applicable codes.
- G. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:

1. Basic Wind Speed: <Insert value>.
2. Building Classification Category: [I] [II] [III] [IV].
3. Minimum 10 lb/sq. ft. multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

B. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: [A] [B] [C] [D] [E] [F].
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: [I] [II] [III].
 - a. Component Importance Factor: [1.0] [1.5].
 - b. Component Response Modification Factor: [1.5] [2.5] [3.5] [5.0].
 - c. Component Amplification Factor: [1.0] [2.5].
3. Design Spectral Response Acceleration at Short Periods (0.2 Second): <Insert percent>.
4. Design Spectral Response Acceleration at 1-Second Period: <Insert percent>.

1.5 SUBMITTALS

A. Product Data for the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.

C. Field quality-control test reports.

1.6 SEISMIC SYSTEM ENGINEERING AND QUALITY ASSURANCE

A. Seismic restraint system shall be engineered to comply with criteria stated and referenced herein.

B. Seismic restraints and related engineering for HVAC, plumbing, and piping systems to be provided by a single vendor.

C. Application of Pre-engineered Assemblies by Seismic Restraint System Engineer:

1. Application of Custom Engineered and/or Pre-Engineered Assemblies, as applicable to this project, and as follows:
 - a. Application of restraints for floor or roof-mounted equipment.
 - b. Application of restraints for curb mounted equipment including unit-to-curb and curb-to-structure attachments.
 - c. Application of seismic restraint assemblies for vibration isolated and suspended equipment.
 - d. Application of seismic restraint assemblies for piping and ductwork.
2. Submittal packages shall bear the stamp of only the responsible Seismic Restraint System Engineer.
3. Approved Pre-engineered Assembly and Application Services: Mason Industries, Kinetics, or an independent professional engineer meeting qualifications listed herein as Seismic Restraint System Engineer.

- D. Custom Engineered Assemblies:
 - 1. System engineering shall include design and application of Custom Engineered Assemblies, as applicable to this project, and as follows:
 - a. Design and Application of restraints for floor or roof-mounted equipment.
 - b. Design and Application of restraints for curb mounted equipment including unit-to-curb and curb-to-structure attachments.
 - c. Design and Application of seismic restraint assemblies for vibration isolated and suspended equipment.
 - d. Design and Application of seismic restraint assemblies for piping and ductwork.
 - 2. Engineering shall be performed by, or under the direct supervision of, a Seismic Engineer meeting the qualifications listed herein. Submittal packages shall bear the signed seal of only the Seismic Engineer.
 - E. Lateral loads and anchorage requirements at attachment to building structural system to be coordinated with project Structural Engineer.
 - F. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- 1.7 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA
- A. A. Pre-submittal:
 - 1. Submit attached letter (at end of this section) outlining how the seismic requirements for this project will be met (i.e., Pre-engineered Assemblies, Custom Assemblies). In the letter state what companies will be providing the services and the qualifications of the responsible individuals.
 - B. Shop drawings shall be submitted as one complete package inclusive of all mechanical systems and equipment.
 - C. Submit the following in accordance with Section "SUBMITTAL PROCEDURES":
 - 1. Seismic Restraint Location Plan: Full or half size copies of ductwork and piping plans from the Contract Documents, showing locations and type of seismic restraint assemblies to be used.
 - a. Drawings shall consist of mechanically reproduced copies of the Contract Documents, or custom drafted specifically for the Work of this Project and bear only the seal of the Seismic Restraint System Engineer or Seismic Engineer. All other seals shall be removed from drawings prior to submittal.
 - b. Provide separate drawings for ductwork and piping systems.
 - c. Each drawing shall be printed on a single sheet. Drawings pieced together from multiple copies are not acceptable.
 - 2. Seismic Restraint Assembly Installation Details: Pre-Engineered or Custom Engineered assembly details showing required components, dimensions, and method of connection to supporting structure.
 - 3. Calculations for System Application: Calculations shall indicate maximum forces anticipated at each restraint assembly, method of determining forces, and selection of restraint assemblies.

- a. For Pre-Engineered Assemblies, include documentation of design conditions, maximum load capacity of assembly, and maximum forces at anchorage points.
 - b. For Custom Engineered Assemblies, submit calculations identifying maximum load capacity of assembly, maximum forces on each component, sizing/selection of each component, and maximum forces at anchorage points.
- D. The entire submittal package comprised of drawings, details, and calculations for mechanical ductwork, piping, and equipment shall be stamped and signed in accordance with the requirements listed under 1.6 SEISMIC SYSTEM ENGINEERING AND QUALITY ASSURANCE in this specification section.
- E. At seismic restraint system installation completion, submit three (3) copies of report from seismic restraint system Engineer, or the Engineer's representative, certifying that seismic restraints are installed in conformance with approved shop drawings and no additional restraints are necessary based on field conditions. Include written authorization, from Seismic Restraint System Engineer, of the designated representative.
- F. Prior to Contract Closeout submit Operation and Maintenance information required as indicated in Section "CLOSEOUT PROCEDURES".

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.
 - 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
- C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
 - 1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

2.2 SEISMIC-RESTRAINT DEVICES

- A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- B. Pre-Engineered Assemblies
 - 1. Anchorage and seismic restraint assemblies comprised of standard or proprietary components, capable of application to restraint system and supporting structure.
 - 2. Acceptable Proprietary Manufacturers: Mason Industries, Kinetics, Tolco, B-Line, or approved.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 VIBRATION-CONTROL DEVICE INSTALLATION

- A. Comply with requirements in Division 07 Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- B. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- C. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.3 SEISMIC RESTRAINT INSTALLATION

A. General

1. Seismic restraint system shall be installed in strict accordance with the manufacturer's written instructions and certified submittal data.
2. Conflicts with other trades that result in rigid contact with the equipment or piping due to inadequate space or other conditions shall be coordinated with the Seismic Restraint Engineer and corrected.
3. Attach restraints and anchors to a common structural element plane and within a common structural system.
4. For vibration isolated suspended equipment, piping, and ducts, install flexible cable restraints slightly slack to avoid vibration short circuiting.
5. For non-isolated suspended equipment, piping, and ducts, install solid braces or taut flexible cable restraints.
6. Provide supplementary support steel for equipment, piping, and ductwork required for the work of this Section.

B. Ductwork And Piping Seismic Restraint

1. Provide minimum of two transverse supports and one longitudinal support on each pipe or duct run. Transverse bracing shall be installed at each turn and at each end of a run with a minimum of one brace at each end. Where a pipe or duct run is shorter than the minimum interval between braces, provide braces at each end.
2. Where restraints are attached to clevis style pipe hangers, the cross bolt must be reinforced.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- #### **A.**
- Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 23 Section "Hydronic Piping" for piping flexible connections.

3.5 ADJUSTING

- #### **A.**
- Adjust isolators after piping system is at operating weight.
- #### **B.**
- Adjust active height of spring isolators.
- #### **C.**
- Adjust restraints to permit free movement of equipment within normal mode of
- #### **D.**
- Operation.

3.6 DEMONSTRATION

- #### **A.**
- Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-mounting systems. Refer to Division 01 Section "Demonstration And Training."

SECTION 23 05 48 - SEISMIC RESTRAINT SYSTEM ENGINEERING PRE-SUBMITTAL

PROJECT: _____
(Project Title)

The Undersigned states the following:

- Seismic restraints for the work of Divisions 22 and 23 for this project will be provided as required in Section 230548.
- Application of Pre-Engineered Restraint Assemblies will be provided by Seismic Restraint System Engineer meeting qualifications of Section 230548.

Seismic Restraint System Engineer: _____

Firm Name: _____

Authorized Representative: _____
(Name of representative authorized to act on Engineer's behalf)

- Design for Custom Engineered Restraint Assemblies will be provided by Seismic Engineer meeting qualifications of Section 230548.

Seismic Engineer: _____

Firm Name: _____

Authorized Representative: _____
(Name of representative authorized to act on Engineer's behalf)

- Upon completion of seismic restraint system installation the Engineers listed above, or the designated representative listed, will inspect and certify that seismic restraints are installed in conformance with approved shop drawings and, based on actual field conditions, no additional restraints are necessary to comply with applicable codes.

Submitted by: _____

Firm: _____

Address: _____

Telephone: _____

Signature: _____

Date: _____

E-mail: _____

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing, adjusting, and balancing of air systems.
 - 2. Measurement of final operating condition of HVAC systems.

1.2 REFERENCES

- A. Associated Air Balance Council:
 - 1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems.
- C. Natural Environmental Balancing Bureau:
 - 1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Test Reports: Indicate data on AABC MN-1 National Standards for Total System Balance forms or NEBB Report forms.
- C. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty or copy of NEBB Certificate of Conformance Certification.
- E. Submit draft copies of report for review prior to final acceptance of Project.
- F. Furnish reports in binder manuals, complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AABC MN-1 National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. Prior to commencing Work, calibrate each instrument to be used.

1.6 QUALIFICATIONS

- A. Test and Balance Engineer's Qualifications: A Professional Engineer (either on the installer's staff or an independent consultant), registered in the State in which the services are to be performed, and having at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.
- B. Agency Qualifications:
 - 1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
 - 2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by NEBB or AABC as a Test and Balance Engineer.

1.7 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Test, adjust, and balance the air systems before hydronic, steam, and refrigerant systems.
- C. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg. F wet bulb temperature of maximum summer design condition, and within 10 deg. F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.
- D. Schedule and provide assistance in final adjustment and test of life safety system with Fire Authority.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify systems are complete and operable before commencing work. Verify the following:
 - 1. Systems are started and operating in safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.

3.2 PREPARATION

- A. Furnish instruments required for testing, adjusting, and balancing operations.
- B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Verify recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
- E. Report defects and deficiencies noted during performance of services, preventing system balance.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in main ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts.
- E. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
- F. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. At modulating damper locations, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to obtain required relationship between each to maintain approximately 0.05 inches positive static pressure near building entries.

3.6 PROJECT CLOSEOUT

- A. Some system balancing and adjusting will be for comfort. Accordingly, contractor shall allow for re-adjusting air quantities or other settings after building completion and occupancy, for user comfort rather than conformance to indicated design values.

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ductwork insulation and jackets.
 - 2. Internal ductwork insulation (duct liner).

1.2 SUBMITTALS

- A. Product Data: Submit product description, list of materials and thickness for each service or equipment scheduled and locations.
- B. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.
- C. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions for each product type.

1.3 QUALITY ASSURANCE

- A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E 84.
- B. Energy Efficiency: Insulate piping and ductwork in accordance with California Code of Regulations Title 24.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not install insulation and related products when ambient temperatures and conditions are not meeting manufacturer's requirements.
- B. Maintain temperature before, during, and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Armacell
 - 2. Certainteed Corp.
 - 3. Ductmate Industries (duct liner only)
 - 4. Johns Manville Insulations.
 - 5. Knauf Insulation
 - 6. Owens-Corning Fiberglas Corp.
 - 7. Reflectix

2.2 DUCTWORK INSULATION

- A. Flexible Glass Fiber: ASTM C553; flexible, noncombustible blanket.
 - 1. k (ksi) Value: 0.29 at 75 degrees F.
 - 2. Vapor Retarder Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, secured with pressure sensitive tape.
- B. Rigid Glass Fiber: ASTM C612; rigid, noncombustible blanket.
 - 1. k (ksi) Value: 0.29 at 75 degrees F.
 - 2. Density: 3.0 lb/cu ft.
 - 3. Vapor Retarder Jacket: Kraft paper with glass fiber yarn and bonded to aluminized film, secured with pressure sensitive tape.
- C. Cellular Foam: ASTM C518 or ASTM C177; flexible, cellular elastomeric, molded or sheet.
 - 1. k (ksi) factor: 0.25 at 75 degrees F.
 - 2. Maximum service temperature: 220 degrees F.
- D. Reflective Insulation: ASTM C518; flexible blanket (bubble wrap).
 - 1. Maximum service temperature: 180 degrees F.
- E. Canvas Jacket: UL listed fabric, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.
- F. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.
- G. Aluminum Jacket: 0.025 inch thick sheet, smooth finish, with longitudinal slip joints and 2 inch laps.
- H. Duct Liner:
 - 1. Fibrous-Glass Duct Liner: ASTM C1071; flexible, noncombustible blanket.
 - a. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 - b. k (ksi) Value: 0.27 at 75 degrees F.
 - c. Adhesive: Waterproof fire-retardant type.
 - d. Liner Fasteners: Galvanized steel, self-adhesive pad or welded with press-on head.
 - 2. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1

2.3 DUCT ACOUSTICAL INSULATION

- A. Manufacturer:
 - 1. Owens-Corning "QuietR" duct liner.
 - 2. Manville "Linacoustic HP"
 - 3. Armacell "Armaflex"
 - 4. or approved equal.

2.4 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to ASTM E 2336 by a NRTL acceptable to authority having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Morgan Thermal Ceramics; FireMaster Fastwrap XL.
 - b. 3M; Fire Barrier Wrap Products.
 - c. Unifrax Corporation; FyreWrap Elite 1.5

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify piping, equipment and ductwork are tested and ready for installation.

3.2 INSTALLATION

- A. Continue insulation vapor barrier through penetrations.
- B. External Ductwork Insulation:
 - 1. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its indented purpose.
 - 2. For insulated ductwork conveying air below ambient temperature install vapor barrier jacket. Finish with tape. Seal vapor barrier penetrations with vapor barrier adhesive.
 - 3. For insulated ductwork conveying air above ambient temperature install with or without standard vapor barrier jacket. Where service access is required, bevel and seal ends of insulation.
 - 4. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 5. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.
 - 6. For exterior applications, install insulation with vapor barrier jacket. Cover with outdoor jacket.
- C. Duct Liner:
 - 1. Duct Lining shall be applied in strict accordance with the latest edition of SMACNA's "HVAC Duct Construction Standard Metal & Flexible" and NAIMA's "Fibrous Glass Duct Liner Standard".
 - 2. Length of mechanical fasteners shall be selected in accordance with the manufacturer's recommendation as listed on each product. Mechanical fasteners shall be installed perpendicular to the duct surface, and in no instance shall the pin compress the liner more than 1/8" relative to the nominal thickness of the insulation.
 - 3. All exposed edges of the duct liner shall be coated with the factory applied edge coating or an adhesive which conforms to ASTM C 916.
 - 4. When duct lining is applied with an adhesive, the adhesive shall be applied to the sheet metal with a 90% minimum coverage. All exposed duct liner edges not coated by the manufacturer shall be coated with the same adhesive. All rips and tears shall be repaired using this same adhesive.
 - 5. Transverse joints shall be firmly butted with no gaps and coated with adhesive. Longitudinal corner joints shall be overlapped and compressed.

6. When air velocities are 4000 to 6000 FPM, metal nosing shall be applied to all upstream transverse edges to additionally secure the insulation.

3.3 SCHEDULES

- A. Ductwork Insulation:
 1. Insulation Omitted: Do not insulate fibrous glass ductwork.
 2. Exposed Outdoor Ductwork:
 - a. Application Requirements: Insulate all exposed outdoor ductwork.
 3. Cold Ductwork (Below Ambient Temperature): Insulate round and oval ductwork in concealed locations and in fan/mechanical areas.
 - a. Application Requirements: Insulate the following cold ductwork:
 - 1) Outdoor air intake ductwork between air entrance and fan inlet or HVAC unit inlet.
 - 2) HVAC supply ductwork between fan discharge, or HVAC unit discharge, and room terminal outlet.
 - 3) Insulate neck and bells of supply diffusers.
 - 4) HVAC plenums and unit housings not pre-insulated at factory or lined.
 4. Hot Ductwork (Above Ambient Temperature): Insulate round and oval ductwork in concealed locations and in fan/mechanical areas.
 - a. Application Requirements: Insulate the following hot ductwork:
 - 1) Range and hood exhaust ductwork.
 - 2) Hot ductwork between fan discharge, or heating unit discharge, and room terminal outlet.
 - 3) Heating plenums and unit housings not pre-insulated at factory or lined.
 5. Insulate ductwork according to the following:
 - a. All supply air ducts and plenums shall be insulated with a minimum of R-4.2 when located in unconditioned spaces.
 - b. All supply and return air ducts and plenums shall be insulated with a minimum of R-8 when located outside the building envelope.
 - c. Install acoustical duct liner in all rectangular supply and return air ductwork for the first 10 feet (minimum) of connections to air handling equipment.

END OF SECTION

SECTION 23 11 23 - FACILITY NATURAL-GAS PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Natural gas piping above grade.
 - 2. Unions and flanges.
 - 3. Strainers.
 - 4. Natural gas pressure regulators.
 - 5. Natural gas pressure relief valves.

1.2 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.
- B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.
- C. Provide pipe hangers and supports in accordance with ASME B31.9, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.
- D. Use plug valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
 - 2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
 - 3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
 - 4. Piping Specialties: Submit manufacturers catalog information including capacity, rough-in requirements, and service sizes for the following:
 - a. Strainers.
 - b. Natural gas pressure regulators.
 - c. Natural gas pressure relief valves.
- C. Design Data: Indicate pipe size. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

- B. Operation and Maintenance Data: Submit for valves and gas pressure regulators installation instructions, spare parts lists, and exploded assembly views.

1.5 QUALITY ASSURANCE

- A. Perform natural gas Work in accordance with NFPA 54.
- B. Perform work in accordance with applicable code and local gas company requirements.
- C. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- D. Perform Work in accordance with applicable code for welding hanger and support attachments to building structure.
- E. Furnish shutoff valves complying with ASME B16.33 or ANSI Z21.15.

PART 2 PRODUCTS

2.1 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M forged steel welding type.
 - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.
- B. Copper Tubing: ASTM B88, Type L annealed.
 - 1. Fittings: ASME B16.26 cast bronze, compression type.
 - 2. Joints: Flared.

2.2 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Copper Piping: Class 150, bronze unions with brazed joints.
 - 3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
 - 1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
 - 2. Copper Piping: Class 150, slip-on bronze flanges.
 - 3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.3 STRAINERS

- A. Manufacturers:
 - 1. Mueller Steam Specialty.
 - 2. O.C. Keckley Company.
 - 3. Spirax Sarco, Inc.
- B. 2 inch and Smaller: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

2.4 NATURAL GAS PRESSURE REGULATORS

- A. Product Description: Spring loaded, general purpose, self-operating service regulator including internal relief type diaphragm assembly and vent valve. Diaphragm case can be rotated 360 degrees in relation to body.
 - 1. Temperatures: minus 20 degrees F to 150 degrees F.
 - 2. Body: Cast iron.
 - 3. Spring case, lower diaphragm casing, union ring, seat ring and disk holder: Aluminum.
 - 4. Disk, diaphragm, and O-ring: Nitrile.
 - 5. Maximum inlet pressure: 150 psig.
 - 6. Furnish sizes 2 inches and smaller with threaded ends. Furnish sizes 2-1/2 inches and larger with flanged ends.

2.5 NATURAL GAS PRESSURE RELIEF VALVES

- A. Product Description: Spring loaded type relief valve.
 - 1. Body: Aluminum.
 - 2. Diaphragm: Nitrile.
 - 3. Orifice: Aluminum.
 - 4. Maximum operating temperature: 150 degrees F.
 - 5. Inlet Connections: Threaded.
 - 6. Outlet or Vent Connection: Same size as inlet connection.

PART 3 EXECUTION

3.1 EXAMINATION

- A. 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with ASME B31.9, ASTM F708 and MSS SP 89.
- B. Support horizontal piping hangers as scheduled.
- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

- F. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
- G. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
- H. Provide copper plated hangers and supports for copper piping.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

3.4 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

- A. Install natural gas piping in accordance with NFPA 54.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide support for utility meters in accordance with requirements of utility company.
- I. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood.
- J. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 09 90 00.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- M. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

3.5 FIELD QUALITY CONTROL

- A. Field inspecting, testing, adjusting, and balancing.
- B. Pressure test natural gas piping in accordance with NFPA 54.
- C. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

END OF SECTION

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Duct Materials.
 - 2. Insulated flexible ducts.
 - 3. Single wall spiral round ducts.
 - 4. Ductwork fabrication.
 - 5. Kitchen hood exhaust ductwork fabrication.
 - 6. Hangers and supports.
 - 7. Duct cleaning.

1.2 PERFORMANCE REQUIREMENTS

- A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data for duct liner and duct connectors.
- C. Qualifications: Submit proof of sheet metal worker training. See Section 1.5.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

1.5 QUALIFICATIONS

- A. All sheet metal workers shall have completed, or shall be enrolled in, a state certified apprenticeship program. The ratio of apprentices to journeymen on the job site shall not be greater than mandated by the state.
 - 1. Prior to start of work, contractor shall submit a list of workers that will be on the project along with proof of their training.
 - 2. Proof of training shall be available on the job site for inspection by the Engineer.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.
- B. Construct ductwork to NFPA 90A and NFPA 90B and NFPA 96 standards.

PART 2 PRODUCTS

2.1 DUCT MATERIALS

- A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90/A90M.
- B. Fasteners: Rivets, bolts, or sheet metal screws.
- C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 FLEXIBLE DUCTS

- A. Manufacturer: Subject to compliance with requirements, provide flexible ductwork of one of the following:
 - 1. Flexmaster.
 - 2. Hercules.
 - 3. Hart & Cooley.
 - 4. Flexible Technologies.
 - 5. JP Lamborn.
- B. Insulated Medium Pressure Flexible Duct:
 - 1. Reference flex duct: Flexmaster Type 5M.
 - 2. The duct shall be constructed of a trilaminate fabric with 2 x 2 crosshatched interwoven scrim supported by helical wound galvanized steel. The fabric shall be mechanically fastened to the steel helix without the use of adhesives.
 - 3. The internal working pressure rating shall be at least as follows with a bursting pressure of at least 2-1/2 times the working pressure:
 - a. Positive: 6 inches w.g.
 - b. Negative: 4 inches w.g.
 - 4. The duct shall be rated for a velocity of at least 4000 feet per minute.
 - 5. Suitable for operating temperature range of -20 deg. F to +250 deg. F.
 - 6. Factory insulate the flexible duct with fiberglass insulation. The R value shall be at least 4.2 Btu/hr/sq.ft./degree F, at a mean temperature of 75 deg. F.
 - 7. Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.

2.3 SINGLE WALL SPIRAL ROUND DUCTS

- A. Product Description: UL 181, Class 1, round spiral lockseam duct constructed of galvanized steel.
- B. Construct duct with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	28
15 inches to 24 inches	26

- C. Construct fittings with the following minimum gages:

Diameter	Gauge
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3 inches to 14 inches	28
15 inches to 18 inches	26
20 inches to 24 inches	24

2.4 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.5 DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards), and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

- E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

2.6 KITCHEN HOOD EXHAUST DUCTWORK FABRICATION

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and NFPA 96.
- B. Exposed Kitchen Hood Exhaust Ducts: Construct of stainless steel ASTM A167, type 316 using continuous external welded joints.
- C. Concealed Kitchen Hood Exhaust Ducts: Construct of 16 gage carbon steel or 18 gage stainless steel ASTM A167, type 316 using continuous external welded joints.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inch and smaller.
- D. Use double nuts and lock washers on threaded rod supports.
- E. Paint buried metal ductwork without factory jacket with one coat and seams and joints with additional coat of asphalt base protective coating.
- F. Connect flexible ducts to metal ducts with draw bands.
- G. Install kitchen range hoods in accordance with NFPA 96. Refer to Section 11 40 00.
- H. Install residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out.
- I. Kitchen hood exhaust ducts: Use stainless steel for ductwork exposed to view and stainless steel or carbon steel where ducts are concealed.

3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Verify attachment selection and spacing in first two paragraphs below with structural engineer.
- C. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Retain subparagraph below for Projects that require seismic restraints.
 - 6. Do not use powder-actuated concrete fasteners for seismic restraints.
- D. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- E. Hangers Exposed to View: Threaded rod and angle or channel supports.
- F. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- G. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete with metal can with spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.
- B. Connect air outlets and inlets to low pressure ducts directly or with five foot maximum length of flexible duct. Do not use flexible duct to change direction.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Dampers.
 - a. Low pressure manual dampers.
 - b. Opposed blade balancing dampers are specified in Section:
Air Inlets and Outlets.
 - 2. Duct silencers.
 - 3. Flexible duct connections.
 - 4. Duct test holes.

1.2 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

1.3 QUALITY ASSURANCE

- A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
- B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

1.4 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

PART 2 PRODUCTS

2.1 DAMPERS

- A. Low Pressure Manual Dampers: Provide dampers of single blade type or multiblade type, constructed in accordance with SMACNA "HVAC Duct Construction Standards".
- B. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:
 - 1. Air Balance, Inc.
 - 2. Airguide Corp.
 - 3. American Warming & Ventilating, Inc.
 - 4. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 - 5. Louvers & Dampers, Inc.
 - 6. Pottorff, Inc.
 - 7. Ruskin Mfg. Co.
 - 8. United.
 - 9. Daniel Mfg.
 - 10. Cesco.
 - 11. NCA.
 - 12. Safe-Air.

2.2 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
 - 1. American/Elgen Co.; Energy Div.
 - 2. Duro Dyne Corp.
 - 3. Flexaust (The) Co.
 - 4. Ventfabrics, Inc.
 - 5. Flexible Metal Hose, Inc.
 - 6. Unisource.
- B. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibration of connected equipment.

2.3 DUCT TEST HOLES

- A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify rated walls are ready for fire damper installation.
- C. Verify ducts and equipment installations are ready for accessories.
- D. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

- A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Install temporary duct test holes and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

3.3 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

END OF SECTION

SECTION 23 34 00 - HVAC FANS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Downblast centrifugal roof fans.
 - 2. Upblast centrifugal roof fans.
 - 3. Ceiling fans.
 - 4. High-plume exhaust fans.
- B. Products furnished but not installed under this Section include roof curbs for roof-mounted exhaust fans and hoods.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.
- C. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Submit fan manufacturer's instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.4 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
- C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- D. Balance Quality: Conform to AMCA 204.

1.5 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

- B. Furnish two sets of belts for each fan.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Fans:
 - 1. Greenheck, Inc.
 - 2. Acme.
 - 3. Cook (Loren) Co.
 - 4. New York Blower.
 - 5. Penn. Ventilator Co.
 - 6. Twin City Fan and Blower Co.
 - 7. Carnes Company, Inc.
 - 8. Broan.
 - 9. U.S. Fan

2.2 FANS, GENERAL

- A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished, with indicated capacities and characteristics. Requirements of individual fan sections take precedence over "Fans, General" section.
- B. Performance:
 - 1. Performance Base: jobsite conditions.
 - 2. Temperature Limit: Maximum 300 degrees F.
 - 3. Static and Dynamic Balance: Eliminate vibration or noise transmission to occupied areas.
- C. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.
 - 1. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.
- D. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - 1. Service Factor: 1.5.
- E. Belts: Oil-resistant, nonsparking, and nonstatic.
- F. Belt Guard: Provide steel belt guards for motors mounted on the outside of the fan cabinet.
 - 1. Fabricate to SMACNA Standard; 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
- G. Motors and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

- H. Shaft Bearings: Provide type indicated, having a median life "Rating Life" (AFBMA (L50)) of 100,000 hours, calculated in accordance with AFBMA Standard 9 for ball bearings and AFBMA Standard 11 for roller bearings.
- I. Factory Finish: The following finishes are required:
 - 1. Sheet Metal Parts: Prime coating prior to final assembly.
 - 2. Exterior Surfaces: Baked-enamel finish coat after assembly.
- J. Disconnect Switch: Factory wired, non-fusible, in fan housing for thermal overload protected motor, NEMA 250 Type 1 enclosure.
- K. Motors: Open drip proof, NEMA MG1: Premium.
- L. Roof Curb (where required): 12 inch high self-flashing of galvanized steel construction with continuously welded seams, built-in cant strips and factory installed nailer strip.
 - 1. Accessories:
 - a. One inch insulation and curb bottom.
 - b. Interior baffle with acoustic insulation, curb bottom
 - c. Ventilated double wall
 - d. Hinged curb adapter.

2.3 DOWNBLAST CENTRIFUGAL ROOF FANS

- A. Fan Unit: Downblast type. V-belt or direct drive (see schedules), with spun aluminum housing; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.
- B. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- C. Accessories:
 - 1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked [and line voltage motor drive, power open, spring return].
 - 2. Motor Operated Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked and [line] [] voltage motor drive, power [open] [closed], [spring return] [].
 - 3. Fan speed controller.

2.4 UPBLAST CENTRIFUGAL ROOF FANS

- A. Fan Unit: Upblast type. V-belt or direct drive (see schedules), spun aluminum housing with grease tray; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.
- B. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- C. Accessories:
 - 1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked [and line voltage motor drive, power open, spring return].

2. Motor Operated Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked and [line] [] voltage motor drive, power [open] [closed], [spring return] [].
3. Fan speed controller.

2.5 CEILING FANS

- A. Centrifugal Fan Unit: Direct driven with galvanized steel housing lined with 1/2 inch acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge opening, integral outlet duct collar.
- B. Disconnect Switch: Fan mounted toggle switch for thermal overload protected motor.
- C. Grille: Molded white plastic.
- D. Wheel: Centrifugal forward curved type constructed of injection molded or polypropylene resin.
- E. Motor: Open drip proof type with permanently lubricated sealed bearings and thermal overload protection.
- F. Accessories:
 1. Wall cap with damper, round duct inlet.
 2. Wall cap with rectangular duct inlet.
 3. Eave elbow.
 4. Roof jack constructed of corrosion resistant, galvanized steel with baked enamel finish.
 5. Roof cap with roof curb.
 6. Filter box.
 7. Brick vent constructed of extruded aluminum with inlet screen.
 8. Rubber-in-shear vibration isolator.
 9. Ceiling radiation damper.
 10. Fan speed controller.
 11. Time delay relay.

2.6 HIGH-PLUME EXHAUST FANS

- A. General
 1. Base fan performance at standard conditions (density 0.075 Lb./ft³).
 2. Fans selected shall be capable of accommodating static pressure and flow variations of +/-15% of scheduled values.
 3. Each fan shall be belt driven.
 4. Each fan to be equipped with 316 stainless steel lifting lugs for corrosion resistance.
 5. Fasteners exposed to corrosive exhaust shall be stainless steel.
 6. Fan assembly shall be designed for a minimum of 125 MPH wind loading, without the use of guy wires.
 7. All fan and system components (fan, nozzle, windband and plenum) shall be corrosion resistant coated with a two part electrostatically applied and baked, sustainable, corrosion resistant coating system. Standard finish color to be gray.
- B. Fan Housing and Outlet
 1. Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.

2. Fan housing shall be welded steel and meet specification section 2.6-A.7 for corrosion resistant coating. No uncoated metal fan parts shall be acceptable.
 3. Fan housings that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, have rough interior surfaces in which corrosive, hazardous compounds can collect, and / or which chalk and structurally degrade due to the UV component of the sunlight shall not be acceptable.
 4. A high velocity conical discharge nozzle shall be supplied by the fan manufacturer and be designed to efficiently handle an outlet velocity of up to 6000 FPM. Discharge stack caps or hinged covers, impeding exhaust flow shall not be permitted.
 5. Provide housing drain for removal of rain and condensation.
 6. A bolted and gasketed access door shall be supplied in the fan housing allowing for impeller inspection or removal of impeller, shaft and bearings without removal of the fan housing.
- C. Fan Motors and Drive
1. Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, TEFC with a 1.15 service factor. A factory-mounted NEMA 3R disconnect switch shall be provided for each fan. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components.
 2. Drive belts and sheaves shall be sized for 200% of the motor horsepower, and shall be readily and easily accessible for service, if required. Drive shall consist of a minimum of two belts under all circumstances.
 3. Fan shaft to be turned and polished of 1040 steel material (optional 316 stainless steel) as standard, coated with corrosion resistant coating.
 4. Fan shaft bearings shall be Air Handling Quality, ball or roller pillow block type and be sized for an L-10 life of no less than 100,000 hours. Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be allowed.
 5. All shaft bearings shall have extended lube lines with zerk fittings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof curbs are installed and dimensions are as shown on shop drawing.

3.2 INSTALLATION

- A. Secure fans and gravity ventilators with cadmium plated steel lag screws to roof curb or structure.
- B. Suspended Fans: Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Install motorized dampers on inlet to roof and wall exhaust fans and gravity ventilators used in relief air applications.
- D. Provide backdraft dampers on outlet from ceiling fans and as indicated on Drawings.

- E. Install safety screen where inlet or outlet is exposed.
- F. Pipe scroll drains to nearest floor drain.
- G. Install motorized dampers on discharge of exhaust fans and as indicated on schedules.
- H. Provide sheaves required for final air balance.

3.3 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Requirements for manufacturer's field services.
- B. Furnish services of factory trained representative for minimum of one day to start-up, calibrate controls, and instruct Owner on operation and maintenance.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

3.5 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate fan operation and maintenance procedures.

3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Diffusers.
 - 2. Registers
 - 3. Grilles.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit sizes, finish, and type of mounting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of air outlets and inlets.

1.4 QUALITY ASSURANCE

- A. Test and rate diffuser, register, and grille performance in accordance with ASHRAE 70.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide grilles, registers, diffusers and door grilles of one of the following:
 - 1. Krueger Mfg. Co.
 - 2. Anemostat Products Div.; Dymanics Corp. of America.
 - 3. Carnes Co.; Div. of Wehr Corp.
 - 4. Titus Products Div.; Philips Industries, Inc.
 - 5. Tuttle & Bailey; Div. of Interpace Corp.
 - 6. Price Air Distribution Products
 - 7. Metal-Aire.
 - 8. Nailor Industries.
 - 9. J & J.

2.2 CEILING DIFFUSERS

- A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

- C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
- D. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule.

2.3 REGISTERS AND GRILLES

- A. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.
- C. Wall and Ceiling Compatibility: Provide registers and grilles with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured to fit into wall and ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of wall register and grille.
- D. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule.
- E. Accessories:
 - 1. Provide manufactures standard opposed blade balancing damper of same material as the outlet material. Dampers shall be fully operable through the face of the outlet, and remain in its set position.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify inlet and outlet locations.
- C. Verify ceiling and wall systems are ready for installation.

3.2 INSTALLATION

- A. Install diffusers to ductwork with airtight connection.
- B. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly. Refer to Section 23 33 00.
- C. Paint visible portion of ductwork behind air outlets and inlets matte black. Refer to Section 09 90 00.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

END OF SECTION

SECTION 23 73 35 - GAS FIRED HEATING AND VENTILATING UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gas fired H&V units with the following accessories:
 - 1. Gas furnace.

1.2 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, and methods of field assembly, components, and location and size of each field connection.
 - 1. Mounting Details: For securing and flashing roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For gas fired H&V units to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of gas fired H&V units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- B. 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.
- C. Comply with NFPA 70.

1.4 COORDINATION

- A. Coordinate size, location, installation, and structural capacity of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."
- B. Coordinate size, location and installation of unit manufacturer's roof curbs and equipment supports with roof Installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AbsolutAire, Inc.
 - 2. ARES; Mars Air Products.
 - 3. Captive-Air Systems, Inc.
 - 4. Greenheck.

5. Hastings Industries; Division of Eric, Inc.
6. Modine Mfg. Co.; Commercial HVAC&R Division.
7. Reznor-Thomas & Betts Corporation; Mechanical Products Division.
8. Sterling Gas; Mestek, Inc.

2.2 PACKAGED UNITS

- A. Unit with Integral Heating shall be fully assembled at the factory and consist of an insulated metal cabinet, outdoor air intake weather hood, motorized intake damper, sensors, curb assembly, filter assembly for intake air, supply air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.

2.3 CABINET

- A. Cabinet: Double-wall galvanized-steel panels, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs. Cabinet shall be fully weatherized for outside installation.
- B. Internal Insulation: Fibrous-glass duct lining, comply with ASTM C 1071, Type II.
 1. Thickness: 1 inch.
- C. Finish: Polyester Urethane (powder): Greenheck Permatector or equal.
- D. Roof Curb: Full-perimeter curb of sheet metal, minimum 11 inches high, with wood nailer, neoprene sealing strip, and welded Z-bar flashing.

2.4 SUPPLY-AIR FAN

- A. Fan Type: Centrifugal, rated according to AMCA 210; statically and dynamically balanced, galvanized steel; mounted on solid-steel shaft.
- B. Motor: Open dripproof, single-speed motor.
- C. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly.
- D. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with restrained, spring isolators.

2.5 OUTDOOR-AIR INTAKE

- A. Outdoor-Air Hood: Galvanized steel with rain baffles, bird screen, and finish to match cabinet; and sized to supply 100 percent outdoor air.

2.6 AIR FILTERS

- A. Comply with NFPA 90A.
- B. Cleanable Filters: 1-inch-thick, cleanable metal mesh.
- C. Disposable Panel Filters: 1-inch thick, factory-fabricated, flat-panel-type, disposable air filters with holding frames, with a minimum efficiency report value (MERV) of 8 according to ASHRAE 52.2.

2.7 DAMPERS

- A. Outdoor-Air Damper: Galvanized-steel, opposed-blade dampers with vinyl blade seals and stainless-steel jamb seals, having a maximum leakage of 10 cfm/sq. ft. of damper area, at differential pressure of 2-inch wg.
- B. Damper Operator: Direct coupled, electronic with spring return or fully modulating as required by the control sequence.

2.8 INDIRECT-FIRED GAS FURNACE

- A. Description: Factory assembled, piped, and wired; and complying with ANSI Z21.47, "Gas-Fired Central Furnaces," and NFPA 54, "National Fuel Gas Code."
 - 1. AGA Approval: Designed and certified by and bearing label of AGA.
 - 2. Burners: Stainless steel.
 - a. Gas Control Valve: Two stage.
 - b. Fuel: Natural gas.
 - c. Minimum Combustion Efficiency: 80 percent.
 - d. Ignition: Electronically controlled electric spark with flame sensor.
- B. Venting: Gravity vented.
- C. Power Vent: Integral, motorized centrifugal fan interlocked with gas valve.
- D. Combustion-Air Intake: Separate combustion-air intake and vent terminal assembly.
- E. Heat Exchanger: Stainless steel.
- F. Heat-Exchanger Drain Pan: Stainless steel.
- G. Safety Controls:
 - 1. Vent Flow Verification: Differential pressure switch to verify open vent.
 - 2. Control Transformer: 24-V ac.
 - 3. High Limit: Thermal switch or fuse to stop burner.
 - 4. Gas Train: Regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, electronic-modulating temperature control valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
 - 5. Purge-period timer shall automatically delay burner ignition and bypass low-limit control.
 - 6. Gas Manifold: Safety switches and controls to comply with ANSI standards.
 - 7. Airflow Proving Switch: Differential pressure switch senses correct airflow before energizing pilot.
 - 8. Automatic-Reset, High-Limit Control Device: Stops burner and closes main gas valve if high-limit temperature is exceeded.
 - 9. Safety Lockout Switch: Locks out ignition sequence if burner fails to light after three tries. Controls are reset manually by turning the unit off and on.

2.9 CONTROLS

- A. Factory-wired, fuse-protected control transformer, connection for power supply and field-wired unit to remote control panel.
- B. Control Panel: remote panel, with engraved plastic cover, and the following lights and switches:
 - 1. On-off fan switch.
 - 2. Heat-vent-cool switch.

3. Supply-fan operation indicating light.
 4. Heating operation indicating light.
 5. Dirty-filter indicating light operated by unit-mounted differential pressure switch.
 6. Safety-lockout indicating light.
- C. Fan Control: Interlock fan to start with exhaust fan(s)
- D. Outdoor-Air Damper Control, 100 Percent Outdoor-Air Units: Outdoor-air damper shall open when supply fan starts, and close when fan stops.
- E. Temperature Control: Operates gas valve to maintain supply-air temperature.
1. Operates gas valve to maintain discharge-air temperature with factory-mounted sensor in blower outlet.
 2. Furnace Control: Two or four steps of control using one or two furnace sections in series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation of gas fired H&V units.
- B. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of connections before equipment installation.
- C. Examine roof curbs and equipment supports for suitable conditions where rooftop replacement-air units will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install gas-fired units according to NFPA 54, "National Fuel Gas Code."
- B. Install roof curb on roof structure. Install and secure gas fired H&V units on curbs, and coordinate roof penetrations and flashing with roof construction.
- C. Install controls and equipment shipped by manufacturer for field installation with gas fired H&V units.

3.3 CONNECTIONS

- A. Piping Connections: Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to machine to allow service and maintenance.
 1. Gas Piping: Connect gas piping with shutoff valve and union and with sufficient clearance for burner removal and service. Provide AGA-approved flexible connectors.
- B. Duct Connections: Drawings indicate the general arrangement of ducts. Connect supply ducts to gas fired H&V units with flexible duct connectors.

3.4 STARTUP SERVICE

- A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1. Inspect for visible damage to furnace combustion chamber.
 - 2. Inspect casing insulation for integrity, moisture content, and adhesion.
 - 3. Verify that clearances have been provided for servicing.
 - 4. Verify that controls are connected and operable.
 - 5. Verify that filters are installed.
 - 6. Purge gas line.
 - 7. Inspect and adjust vibration isolators.
 - 8. Verify bearing lubrication.
 - 9. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - 10. Adjust fan belts to proper alignment and tension.
 - 11. Start unit according to manufacturer's written instructions.
 - 12. Complete startup sheets and attach copy with Contractor's startup report.
 - 13. Inspect and record performance of interlocks and protective devices; verify sequences.
 - 14. Operate unit for run-in period recommended by manufacturer.
 - 15. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
 - a. Gas Burner:
 - 1) Measure gas pressure at manifold.
 - 2) Measure combustion-air temperature at inlet to combustion chamber.
 - 3) Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
 - 16. Calibrate thermostats.
 - 17. Adjust and inspect high-temperature limits.
 - 18. Inspect dampers, if any, for proper stroke and interlock with return-air dampers.
 - 19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
 - 20. Measure and record airflow. Plot fan volumes on fan curve.
 - 21. Verify operation of remote panel, including pilot-operation and failure modes. Inspect the following:
 - a. High-limit heat.
 - b. Alarms.
 - 22. After startup and performance testing, change filters, verify bearing lubrication, and adjust belt tension.
- B. Remove and replace malfunctioning components that do not pass tests and inspections and retest as specified above.
- C. Prepare written report of the results of startup services.

3.5 ADJUSTING

- A. Adjust initial temperature set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gas fired H&V units. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 237333

SECTION 23 81 03 - PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Packaged rooftop air conditioning unit.
 - 2. Roof curb.

1.2 DEFINITIONS

- A. Energy Efficiency Ratio (EER) - Ratio of net cooling capacity in Btuh to total rate of electric input in watts under designated operating conditions.
- B. Seasonal Energy Efficiency Ratio (SEER) - Total cooling output of an air conditioner during its normal annual usage period for cooling (in Btu) divided by total electric energy input during the same period (in Wh).

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data indicating:
 - 1. Cooling and heating capacities.
 - 2. Dimensions.
 - 3. Weights.
 - 4. Rough-in connections and connection requirements.
 - 5. Duct connections.
 - 6. Electrical requirements with electrical characteristics and connection requirements.
 - 7. Controls.
 - 8. Accessories.
- C. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of controls installed remotely from units.
- C. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.

1.5 QUALITY ASSURANCE

- A. Cooling Capacity: Rate in accordance with ARI 210/240 or ARI 340/360.
- B. Sound Rating: Measure in accordance with ARI 270.
- C. Insulation and adhesives: Meet requirements of NFPA 90A.

- D. Performance Requirements: Conform to minimum EER or SEER prescribed by ASHRAE 90.1 when tested in accordance with ARI 210/240 or ARI 340/360.
- E. Outside Air Damper Leakage: Test in accordance with AMCA 500.

1.6 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate installation of roof curbs with roof structure, roof deck and roof membrane installation.

PART 2 PRODUCTS

2.1 ROOFTOP AIR CONDITIONING UNITS

- A. Manufacturers:
 - 1. Aeon Incorporated.
 - 2. Bryant.
 - 3. Carrier Corp.
 - 4. Lennox International.
 - 5. McQuay International.
 - 6. The Trane Company.
 - 7. York/Johnson Controls.
- B. Product Description: Self-contained, packaged, factory assembled and wired, consisting of roof curb, cabinet, supply fan, refrigerant cooling coil, compressor, refrigeration circuit, condenser, gas-fired heating section, air filters, mixed air casing, controls, and accessories.
- C. Configuration: As indicated on Drawings.
- D. Roof Mounting Curb: 14 inch high, galvanized steel, channel frame with gaskets, nailer strips. Full perimeter type for mounting under entire unit.
- E. Cabinet:
 - 1. Designed for outdoor installation with weatherproof construction.
 - 2. Panels: Constructed of steel with baked enamel finish meeting salt spray test in accordance with ASTM B117. Furnish access doors or removable access panels.
 - 3. Insulation: Factory applied to exposed vertical and horizontal panels, aluminum foil faced glass fiber with edges protected from erosion.
- F. Supply Fan: Forward curved centrifugal type, resiliently mounted with high efficiency motor. Motor permanently lubricated with built-in thermal overload protection.
- G. Evaporator Coil: Constructed of copper tubes expanded onto aluminum fins. Galvanized drain pan with piping connection. Factory leak tested under water.
- H. Compressor: Hermetically sealed, resiliently mounted with positive lubrication, and internal motor overload protection.
- I. Refrigeration circuit: Furnish the following for each circuit expansion device, filter-drier, suction, discharge, and liquid line service valves with gauge ports, high and low pressure safety controls. Dehydrate and factory charge each circuit with oil and refrigerant.

- J. Condenser:
1. Coil: Copper tube aluminum fin coil assembly and coil guard. Factory leak tested under water.
 2. Condenser Fan: Direct drive propeller fans statically and dynamically balanced. Wired to operate with compressor. Motor permanently lubricated with built-in thermal overload protection. Furnish high efficiency fan motors.
- K. Gas-Fired Heating Section:
1. Heat Exchangers: stainless steel, welded construction.
 2. Gas Burner: burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot. Require unit fan operation before allowing gas valve to open.
- L. Air Filters: 2 inch thick glass fiber disposable media in metal frames.
- M. Mixed Air Casing:
1. Outside Air Damper Leakage: Maximum 4 cfm per square foot at 1.0 inches wg pressure differential.
 2. Outside Air Damper: Manual, for fixed outside air quantity. Furnish rain hood with screen.
 3. Outside Air Damper: Automatic, two position spring return. Interlocked to open when supply fan starts. Outside air damper normally closed and return air damper normally open. Furnish rain hood with screen.
 4. Economizer: Factory installed fully modulating motorized outside air and return air dampers controlled by enthalpy controller with minimum position setting. Outside air damper normally closed and return air damper normally open.
 - a. Furnish barometric relief damper with powered exhaust.
- N. Controls:
1. Furnish control to provide low ambient cooling to 0 degrees F.
 2. Furnish low limit thermostat in supply air to close outside air damper and stop supply fan.
 3. Furnish terminal strip on unit for connection of operating controls to remote panel.
 4. Thermostat: 7 day programmable electronic space thermostat with 2 stage heating and 1 or 2 stage cooling with [automatic changeover and heating setback and cooling setup capability. Furnish system selector switch off-heat-auto-cool and fan control switch, auto-on.
 5. Microprocessor Based Controls:
 - a. Factory mounted with the following features:
 - 1) Monitor each mode of operation.
 - 2) Evaporator fan status.
 - 3) Filter status.
 - 4) Indoor air quality.
 - 5) Supply air temperature.
 - 6) Outdoor air temperature.
 - b. Diagnostics for thermostat commands for staged heating, staged cooling, fan operation, and economizer operation.
- O. Accessories:
1. Convenience Outlet: Factory installed, 115 volt, 15 amp, GFCI type, internally mounted.
- P. Disconnect Switch: Factory mounted, non-fused type, interlocked with access door, accessible from outside unit, with power lockout capability.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof curbs are installed and dimensions are as instructed by manufacturer.

3.2 INSTALLATION

- A. Roof Curb:
 - 1. Assemble roof curb.
 - 2. Install roof curb level.
 - 3. Install units on roof curb providing watertight enclosure to protect ductwork and utility services.
 - 4. Install gasket material between unit base and roof curb.
- B. Connect units to supply and return ductwork with flexible connections.
- C. Install condensate piping with trap and route from drain pan to splash block on roof.
- D. Install components furnished loose for field mounting.
- E. Install electrical devices furnished loose for field mounting.
- F. Install control wiring between unit and field installed accessories.

3.3 INSTALLATION - NATURAL GAS HEATING SECTION

- A. Connect natural gas piping in accordance with NFPA 54.
- B. Connect natural gas piping to unit, full size of unit gas train inlet. Arrange piping with clearances for burner service.
- C. Install the following piping accessories on natural gas piping connections.
 - 1. Strainer.
 - 2. Pressure gage.
 - 3. Shutoff valve.
 - 4. Pressure reducing valve.
- D. Install natural gas piping accessories above roof.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Requirements for manufacturer's field services.
- B. Furnish initial start-up and shutdown during first year of operation, including routine servicing and checkout.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Vacuum clean coils and inside of unit cabinet.

- C. Install temporary filters during construction period. Replace with permanent filters at Substantial Completion.

3.6 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate unit operation and maintenance.
- C. Furnish services of manufacturer's technical representative for one 8 hour day to instruct Owner's personnel in operation and maintenance of units. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.

END OF SECTION

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 COMMON WORK RESULTS FOR ELECTRICAL

- A. This Section covers electrical work, complete. Furnish material, labor, and equipment in accordance with these Specifications, the accompanying Drawings, and the directions of the Engineer.

1.2 GENERAL

- A. Description of Project: Power distribution and lighting design for a 7,000-square-foot addition to an existing community center located in McKinleyville, California.
- B. Intent of Drawings: Exact conduit locations are not shown unless so indicated or specifically dimensioned.

1.3 ELECTRICAL

- A. Electrical installations shall meet all applicable requirements of referenced NFPA and other documents. In addition, comply with all requirements of the Authorities Having Jurisdiction.
- B. This project includes furnishing, installing, and/or interfacing with numerous package systems. Coordinate with and among system suppliers, and furnish and install all materials and devices necessary for complete and operable systems. Systems shall meet specified requirements, as well as conform to manufacturer recommendations.
- C. Some products are specified on the Drawings and not in these Specifications. Submittal requirements shall apply to all specified products, whether specified on the Drawings or in these Specifications.
- D. Provide all first-quality new materials.
- E. Furnish and install all incidental items not specifically shown or specified which are required by good practice to provide complete systems.
- F. All of the work executed under this Section shall meet the requirements of related disciplines as if fully stated herein.
- G. See Architectural documents for other requirements including as applicable General Conditions, Bidding and Construction Schedule, Safety Requirements, Mobilization Requirements, and other Contract Terms and Conditions.
- H. All Contract Documents, including but not limited to Plans, Specifications, Instructions to Bidders, and other published documents, are a part of the Contract.

- I. See Architectural documents for fire-stopping requirements, and comply with State Fire Marshal requirements for approved and listed fire-stopping systems. See Architectural Drawings for fire-stop finish details. At a minimum, penetration of fire rated walls, floor-ceilings, and roof-ceilings shall meet Uniform Building Code (UBC) Sections 709 and 710.

1.4 CODES, PERMITS, AND REGULATIONS

- A. Do all work and install materials and equipment in accordance with the requirements of the National Electrical Code (NEC), NFPA 70, Underwriters Laboratories (UL), applicable State and local laws and ordinances, and the power company.
- B. Conflicts, if any, that may exist among the above items, will be resolved at the discretion of the Engineer.
- C. Wherever the requirements of the Specifications or Drawings exceed those of the items above, the requirements of the Specifications or Drawings shall govern.

1.5 SUBMITTALS

- A. General:
 - 1. Provide complete submittals as specified herein and as required to completely describe the equipment and systems being provided.
 - 2. Refer to other specifications, as applicable, for additional submittal requirements.
 - 3. Revise and resubmit all submittal information until acceptable to the Engineer.
 - 4. Review of submittal information by the Engineer shall not relieve the Contractor of responsibility for meeting the requirements of the Drawings and Specifications or for errors and omissions in submittals.
- B. Product Submittals:
 - 1. Before any material is fabricated or shipped, furnish to the Engineer full details, shop drawings, dimensions, catalog cuts, schematic (elementary) diagrams, wiring diagrams, and other descriptive matter as required to fully describe the products specified under this Section.
 - 2. For service entrance equipment, meter base, and other related materials, obtain written approval of submittals from the serving utility before submitting to the Engineer.

1.6 APPROVALS AND INSPECTIONS

- A. Plan, coordinate, and obtain approvals and inspections from all applicable agencies and Authorities Having Jurisdiction.

1.7 WARRANTY

- A. The work and materials covered in this Section shall be guaranteed for a period of 1 year from the date of acceptance thereof against defective materials, design, and workmanship.

PART 2 – PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Materials and equipment for this project is as specified in the individual sections.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall be performed in a workmanlike manner by craftsmen skilled in the particular trade. Work shall be performed in accordance with the Drawings, Specifications, manufacturers' recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance.
- B. Coordinate electrical work with the Owner and the work of other trades to avoid conflicts, errors, delays, and unnecessary interference during construction.

3.2 PROTECTION DURING CONSTRUCTION

- A. Throughout this Contract, provide protection for materials and equipment against loss or damage and from the effects of weather.
- B. Following installation, protect materials, equipment, and insulation from corrosion, physical damage, and moisture.

3.3 MATERIAL AND EQUIPMENT INSTALLATION

- A. Follow the manufacturer's installation recommendations unless otherwise indicated.
- B. Coordinate equipment seismic bracing requirements with the local authorities and manufacturer of equipment.
- C. Completed work shall present a neat and finished appearance. Furnish and install incidental items not specifically shown or required by good practice to provide a complete electrical system.
- D. Provide engraved nameplates for all pieces of equipment. Plates shall be screw-on, 3-ply, black face, white 1/4-inch-high Gothic lettering.
- E. Install freestanding equipment in accordance with the manufacturer's recommendations. Unless noted otherwise, mount freestanding equipment on a 3-1/2-inch concrete pad. Secure freestanding equipment rigidly to floors or mounting pads with anchor bolts, expansion shields, or other approved means.
- F. Unless noted otherwise, pieces of freestanding equipment located adjacent to one another shall be installed such that the fronts line up.

3.4 DEMOLITION

- A. This is a rehabilitation project which includes demolition, as described in the Drawings and Specifications. Required demolition of electrical equipment, wire and conduit, and other equipment is covered under this Section. Demolition work includes disconnecting, removing, capping, patching, painting, and cleanup.
- B. Where existing materials and equipment are removed or relocated, remove all materials no longer used, such as studs, straps, conduits, and wires. Remove or cut off concealed or embedded conduit, boxes, or other materials and equipment to a point at least 3/4 inch below the final finished surface.
- C. The Contractor shall remove from the site all demolished parts and equipment. All hazardous equipment shall be properly disposed of.
- D. Repair affected surfaces to conform to the type, quality, and finish of the surrounding surface in a neat and workmanlike manner. Follow any specific instructions in other sections of these Specifications. Utilize skilled craftsmen of the trades involved.

3.5 CUTTING AND PATCHING

- A. Do not cut or notch any structural member or building surface without specific approval of the Engineer. Carefully carry out any cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, paving, or other surfaces required for the installation, support, or anchorage of conduit, raceways, or other electrical materials and equipment. Following such work, restore surfaces neatly to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner.

3.6 CLEANING AND TOUCHUP PAINTING

- A. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved, at no additional cost to the Owner.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers low-voltage conductors, terminations, and installation.

PART 2 – PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Materials and equipment for this project shall all be first quality, new materials, free from any defects, in first class condition, with ratings as shown on these Drawings.

2.2 CONDUCTORS

- A. This Article covers insulated wire and cable, not buses.
- B. Conductors shall be copper unless aluminum is indicated. Unless noted otherwise, power and discrete conductors shall be stranded 600-volt type THWN (wet) or THHN (dry).
- C. For control, signaling, communications, and networking interconnection, conductors and cabling shall meet the following:
1. Conform to manufacturer recommendations.
 2. Meet all applicable standards referenced in Section, ELECTRICAL.
 3. Be suitable for the environment in which they are installed.

PART 3 – EXECUTION

3.1 CONDUCTORS AND TERMINATIONS

- A. General:
1. Wire shall be continuous from outlet to outlet of the raceway system. Conductors shall not be smaller than No. 12 AWG for lighting and power circuits, No. 14 AWG for control circuits, and No. 18 AWG for twisted shielded cables, unless otherwise indicated.
 2. Conductors shall be stranded; except solid conductors No. 10 AWG and No. 12 AWG may be used for branch circuit power wiring and for lighting and receptacle circuits.
 3. Provide adequate length pigtails for conductors connected by others.
- B. Splices and Terminations:
1. Preferably, conductors shall be run between pieces of equipment without splices. Splices, where required, shall be made in accessible boxes only. Splices shall not be made below finish grade unless indicated on the Drawings or approved by the Engineer.
 2. Soldering shall not be used, except where required by the type of device terminals.
 3. Make splices and terminations of stranded conductors using crimp-type or mechanical devices suitable for the type and size of conductor used.
 4. For control wiring, use preinsulated ring-tongue crimp-type devices, except where terminals of factory-supplied equipment do not so allow. Use terminals, connectors, and installation tools as recommended by the manufacturer. Crimp-type lugs shall be applied with a tool so designed that once the crimping action is started, the tool cannot be removed until the crimping action is completed.

5. Do not use wire nuts or solder for splices or terminations; except wire nuts may be used with solid wires as indicated below.
 6. For solid conductors No. 12AWG and smaller and for terminations at individual lighting fixtures, make splices and terminations using wire nuts or threaded mechanical devices suitable for the type and size of the conductor used. Wire nuts shall be the coiled, spring-loaded type. Do not use wire nuts constructed of one solid piece (not spring loaded).
 7. For solid conductors No. 10AWG and larger, make splices and terminations using threaded mechanical devices suitable for the type and size of conductor used.
- C. For control, signaling, communications, and networking interconnections, do the following:
1. Coordinate interconnection among systems and sources of supply. Provide all required interconnection.
 2. Comply with all requirements, including those covered in standards called out in Section, ELECTRICAL.
 3. Obtain and conform to recommendations and requirements of system manufacturers.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers grounding and bonding for electrical systems.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for this project shall be first quality, new materials, free from any defects, in first class condition, with ratings as shown on these Drawings.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall be performed in a workmanlike manner by craftsmen skilled in the particular trade. Work shall be performed in accordance with the Drawings, Specifications, manufacturers' recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance. Reference items below for specific requirements.
1. Complete electrical system shall be grounded in accordance with the presently adopted edition of the National Electrical Code (NEC), and as shown on the Drawings.
 2. Unless otherwise indicated, ground all exposed noncurrent-carrying metallic parts of electrical equipment, raceway systems, and the neutral of all wiring systems in accordance with the NEC, State, and other applicable laws and regulations. Where metallic conduit is not grounded at its termination, it shall be separately grounded with a ground clamp and ground wire.
 3. Provide grounding points (foundation ground points) at each building and structure. Grounding electrode shall be No. 4 minimum-size, 20-foot-minimum-length piece of reinforcing steel located near the bottom of the concrete foundation. Attach the ground wires to the reinforcing steel by thermite welding.
 4. Where ground rods are indicated or used, they shall be copper clad, not less than 3/4 inch in diameter, 10 feet long, driven into the earth such that at least 8 feet is in contact with the soil, as required by NEC Article 250-52. Excess length may be cut off.
 5. Make ground connections by brazing, thermite welding, or with approved compression grounding connectors. Grounding and bonding to steel shall be done with thermite welding.
 6. The point of contact of each thermite weld shall be wire brushed or filed to a bare metal surface. Thermite welding cartridges and molds shall be used in accordance with the manufacturer's recommendations. After the welds have been made and cooled, slag shall be brushed from the welded area and the joint thoroughly cleaned. Use materials made by Burndy, Erico (Cadweld), or equal.
 7. Compression grounding connectors shall meet the following requirements:
 - a. Compression grounding connectors shall be suitable for the intended use; shall be suitable for direct-burial and embedded applications; and shall be designed for connecting to copper and copper-clad conductors, both stranded and solid, and to copper-clad, galvanized, and stainless steel ground rods.
 - b. Connectors shall be prefilled with corrosion-inhibiting compound which is compatible with the conductors being joined.
 - c. Connectors shall meet the requirements of IEEE standard 837-1984 (or later revision), and shall be listed by UL for direct burial in earth and embedment in concrete.
 - d. Connectors shall be selected and installed according to the recommendations

- of the manufacturer.
- e. Compression grounding connectors shall be Burndy "Hyground," or equal.
- 8. At the request of, and in the presence of the authorized inspector, the Contractor shall provide system resistance readings.

END OF SECTION

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers all raceway and boxes for electrical systems.

PART 2 – PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Materials and equipment for this project shall be first quality, new materials, free from any defects, in first class condition, with ratings as shown on these Drawings.

2.2 CONDUIT

- A. Galvanized Rigid Steel Conduit (GRS): Rigid steel conduit including couplings, elbows, nipples, and other fittings shall be galvanized after fabrication by hot-dipping, electroplating, or a metalizing process. Conduit bodies and covers shall be of cast malleable galvanized ferrous materials. Provide covers with gaskets.
- B. Electrical Metallic Tubing (EMT): Electrical metallic tubing, including couplings and elbows, shall meet the requirements of the NEC.
- C. Rigid PVC Conduit (PVC): Rigid polyvinyl chloride (PVC) conduit shall be schedule 40 UL listed for concrete-encased, direct burial underground, and exposed use. PVC conduit shall be rated 90 degrees C.
- D. Flexible Conduit (flex): Flexible conduit shall be moistureproof flexible steel, polyvinyl chloride jacketed, UL approved, and shall be Anaconda Sealtite conduit, Electriflex, or equal. Flexible conduit used in dry, concealed areas for lighting fixtures may be non-moistureproof flexible steel conduit, Anaconda Type CN, Triangle Tristee, or equal.
- E. Metal Clad Cable (MC): Factory assembly of one or more insulated circuit conductors, enclosed in an armor of interlocking sheath. Connectors and fittings used on MC Cable shall be listed and identified for the cable type.

2.3 BOXES

- A. General:
1. Boxes shall not be smaller than required to meet the minimum requirements of the National Electrical Code (NEC).
 2. Install boxes in a rigid and satisfactory manner, and support boxes independently of the conduit.
- B. Sheet Steel Boxes, Small (Up To 4" X 4"):
1. These boxes shall include sizes up to 4 inches square and ganged switch boxes.
 2. Sheet steel boxes shall be zinc- or cadmium-plated, and shall be of the one-piece stamped or drawn type, or welded, except when not available in the size required.
 3. Provide boxes of adequate size without using box extensions.
 4. For hollow masonry construction, provide boxes of sufficient depth so that conduit knockouts or hubs are in the masonry void space.

5. Provide covers and device plates as called out under RACEWAY SYSTEM. Type to be Used, in the Part, EXECUTION.
- C. Sheet Steel Boxes, Large (Larger Than 4" X 4"):
1. Boxes shall be 16-gauge sheet steel, minimum, with welded seams.
 2. Boxes shall be NEMA 1, minimum, in dry locations and NEMA 3R, minimum, in damp and wet locations.
 3. Provide hinged covers on boxes with length or width greater than 24 inches. Hinges shall be full length, with stainless steel hinge pins. Hinged covers shall have secure closing provisions. Provide draw-pull catches (two minimum), three-point latch with a single handle, or clamps on three sides to clamp the cover.
 4. Finish shall be ANSI 61 gray over a primer and rust inhibitor.
 5. Boxes shall be Hoffman, Tanco, Keystone, Electromate, or equal.
- D. Cast Boxes:
1. Cast boxes shall be galvanized malleable ferrous metal, gasketed and watertight, with threaded conduit hubs and mounting lugs. Boxes shall have a minimum (inside) depth of 2 inches.
 2. Provide stamped steel covers with gaskets and stainless steel or galvanized steel screws; except provide weatherproof cast covers for switches and receptacles outdoors and in other wet or damp locations.
 3. Cast boxes shall be Crouse Hinds FD, Appleton FD, or equal.

PART 3 – EXECUTION

3.1 RACEWAY SYSTEM

- A. General: Raceway system shall be installed in accordance with the National Electrical Code (NEC). Unless otherwise specified or indicated, wiring shall consist of insulated conductors installed in raceways of the types indicated.
- B. Types to be Used: Minimum size conduit shall be 1/2 inch; except 3/4-inch minimum shall be used for embedded conduit, unless indicated otherwise on the Drawings. Use the following types of conduit and boxes for the locations listed below, unless shown otherwise on the Drawings.
1. Use electrical metallic tubing (EMT) with sheet steel boxes and stamped steel covers in exposed, interior, dry locations.
 2. Concealed locations: In concealed locations (sheet rock walls, ceilings), use EMT conduit with sheet steel boxes. Use stamped steel covers and device plates in dry locations, and use cast weatherproof covers and device plates with gaskets in wet and damp locations; except use plastic covers and device plates in dry, finished areas.
 3. EMT may be used in place of PVC in dry, concealed locations, and GRS may be used as a substitute in any location.
 4. Use liquidtight flexible metal conduit (flex) for the last 18 to 36 inches of conduit run to a piece of equipment where required to isolate vibration or to facilitate maintenance or adjustment. Flexible metal conduit (non-moistureproof) may be used in dry, concealed areas for lighting fixtures.
 5. Use MC Cable in concealed interior locations (sheet rock walls, ceilings). Not to be used for home runs.
 6. Use rigid polyvinyl chloride (PVC) conduit for buried and embedded locations, except use galvanized rigid steel (GRS) at least 5 feet on both sides of penetrations through footings and outside walls, under equipment mounting pads, where embedded in exterior light pole foundations, and where conduit changes from underground to exposed or from embedded to exposed.
 7. Use galvanized rigid steel conduit (GRS) outdoors and in wet locations. Provide cast weatherproof covers and device plates with gaskets in wet and damp locations.

C. Boxes:

1. Provide each outlet in the wiring or raceway systems with a box to suit the conditions encountered. Provide flush or recessed fixtures with separate junction boxes when required by the fixture terminal temperature requirements. Boxes used with concealed conduits shall be flush mounted, unless otherwise indicated on the Drawings.
2. Install boxes in a rigid and satisfactory manner, and support boxes independently of the conduit.

D. Installation:

1. Conduit system installation shall meet or exceed the requirements of the NEC. Raceways shall be entirely free of obstructions or shall be replaced. All conduit shall be reamed, deburred, and cleaned for proper introduction of wires and cables. Immediately after installation, plug or cap all conduit ends with watertight and dusttight conduit seals until the time for pulling wires.
2. Conduit shall be of the greatest practicable single length between joints.
3. Install conduit, boxes, and fittings outdoors or in other wet locations so as to prevent water from entering the conduit. Do not run conduit through equipment foundation pads.
4. Empty ducts and conduits shall be identified at both ends and shall be capped and provided with a flat pull tape (Mule Tape, or equal).
5. For PVC conduit, use factory-made ells where applicable. Use approved heating methods for forming all other bends. Provide expansion joints as required by the NEC and as recommended by the manufacturer. When joining PVC conduit to metallic fittings, use approved PVC terminal adapters. When joining PVC conduit to rigid steel conduit, use an approved PVC female adapter. PVC conduit joints shall be solvent-welded with solvent recommended by the conduit manufacturer. Where PVC conduit is used, a separate grounding conductor shall be run with the conductors.
6. Concealed, embedded, and buried conduits shall emerge at right angles and shall have none of the curved portion of a bend exposed. Embedded and underground ells shall be galvanized rigid steel conduit.
7. Where conduit size is 4 inches or less, final connection to motors, wall- or ceiling-mounted fans, dry transformers, and to other equipment where flexible connection is desired or required to minimize vibration or to facilitate maintenance or removal of equipment, shall be made with flexible conduit. Length shall be 18 inches to 36 inches, unless otherwise approved by the Engineer.
8. Flexible conduit shall not be used as a ground. Where flexible conduit is used, a separate grounding conductor shall be run with the conductors. Flexible conduit shall be secured with conduit clamps or equivalent means except where the flexible conduit is fished and where sections less than 4 feet in length are used in concealed areas for lighting fixtures.

3.2 UNDERGROUND AND EMBEDDED CONDUIT

A. Arrangement and Routing:

1. Arrange multiple conduit runs substantially in accordance with details shown on the Drawings.
2. Make minor changes in location or cross section as necessary to avoid obstructions or conflicts.
3. Where piping on other utility systems are encountered or being installed along a raceway route, maintain a 12-inch minimum vertical separation between raceways and other systems at crossings. Maintain a 12-inch minimum separation between raceways and other systems in parallel runs. Do not place raceways over valves or couplings in other piping systems which may restrict access.

- B.** Except as otherwise indicated, cover for underground and embedded conduit shall be as tabulated in Table 1, except conduit under building slabs may be just below the slab. Do not

embed conduit in slabs. Conduit installation shall meet the requirements of the NEC.

TABLE 1
COVER REQUIREMENTS FOR BURIED RACEWAYS

<u>Type of Buried Raceway</u>	<u>Areas of Vehicle Access (Roads, Parking Areas, etc.)</u>	<u>Other Areas</u>
Direct-Buried Conduit	36 inches, with warning tape 12 inches above conduit	18 inches, with warning tape 12 inches above conduit

- C. Separate parallel runs of four or more conduits in a single trench or embedded duct bank with preformed, nonmetallic spacers designed for the purpose. Install spacers at 6 feet or at intervals not greater than that specified in the NEC for support of the type of conduit used. Support conduits installed in fill areas suitably to prevent accidental bending until backfilling is complete.
- D. Trenching and Backfill:
1. Trench bottoms shall be free of rocks and other hard objects. Bedding material shall be used for a depth of 3 inches below the conduit or cable, and bedding material shall be used for the zone 6 inches above the conduit or cable.
 2. Bedding material shall contain no rocks larger than 3/4 inch in diameter and shall be free from roots and debris.
 3. Unless otherwise shown on the Drawings, that zone from 6 inches above the conduit to the top of the trench shall be the material removed from the trench; except that it shall contain no rocks larger than 6 inches and shall be free of roots and debris.
 4. Where conduit trenches are located in roads or in structural backfill, the compaction requirements shall be as required for those areas. Where conduit trenches are located in an area where backfill material specifications are more rigid than those of this section, the trench backfill shall meet the more rigid specification. In any event, trench backfill compaction shall be at least equal to that of the material adjacent to the trench.
 5. Conduits shall be placed parallel in the bottom of the trench. Where conduits are required to cross, they shall be separated by a minimum of 3 inches of bedding material. Where more than one level of conduit are placed in the same trench, they shall be separated by a minimum of 3 inches of bedding material.
 6. As shown in Table 1, backfill shall include warning tape over the entire length of the run.
 7. Conduit trenches in areas to be paved or improved under this project shall be installed and backfilled before the area is paved or improved.
 8. All existing improvements damaged as a result of the Contractor's operation shall be reconstructed by the Contractor at no cost to the Owner.
- E. Penetrations:
1. Penetration of any fire-rated partition shall be protected in accordance with the Uniform Building Code 709 and 710.

3.3 WARNING TAPE

- A. Provide heavy-gauge, yellow plastic tape of 6-inch minimum width for use in trenches containing electric circuits. Utilize tape made of material resistant to corrosive soil. Use tape with printed warning that an electric circuit is located below the tape.
- B. Manufacturers and types: ITT Blackburn Type YT or RT, Griffolyn Co. Terra-Tape, or equal.

END OF SECTION

SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section includes commissioning of the electrical system for this remodel.

PART 2 – PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Materials and equipment for this project is as specified in the individual sections.

PART 3 – EXECUTION

3.1 COMMISSIONING OF ELECTRICAL SYSTEMS

- A. The electrical system shall be furnished, installed, started up, tested, and commissioned in accordance with the National Electrical Code (NEC).
- B. This project includes furnishing, installing, and/or interfacing with numerous package systems. Execute all required testing for each system, meeting the following requirements:
- Perform specified testing as applicable to the system(s) at hand.
 - Perform all testing as recommended by the manufacturers.
 - Perform all testing as called for in the referenced standards.
 - Perform all testing as required by the Authorities Having Jurisdiction.
- C. Once the facility has been started up and is operating, a witnessed Functional Acceptance Test (FAT) shall be performed on the equipment and systems to demonstrate that they are operating as specified and meet the requirements and intent of the Drawings and Specifications. The Contractor shall prepare a test procedure(s) and conduct the test(s).
- D. The FAT shall be performed by the Contractor.
- E. The FAT shall include any Contractor's personnel, subcontractors, suppliers' representatives, and other necessary personnel required for a successful test. The Contractor is responsible for coordinating among required personnel.
- F. The FAT shall operate all equipment and systems over the full operating range, shall demonstrate proper operation of alarms and indicators, and, in general, shall demonstrate that the equipment and systems meet the requirements and intent of the Drawings and Specifications.
- G. If any equipment or system fails the FAT, the Contractor shall correct the problem and shall repeat the test until it is successful.
- H. The FAT shall be performed in the presence of the Architect and the Owner.
- I. Submit marked-up "as-built" Drawings with final installed arrangements, including equipment model numbers and performance data.
- J. Submit operation and maintenance manuals.

PART 4 – PAYMENT

4.1 PAYMENT

- A. Payment for the work covered in this Section shall be included as part of the lump sum bid.

END OF SECTION

SECTION 26 24 00 - SWITCHBOARDS AND PANELBOARDS

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers all switchboards and panelboards for this project.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for this project shall be first quality, new materials, free from any defects, in first class condition, with ratings as shown on these Drawings.
- B. Service equipment shall include a meter base, copper busing, and other materials and work that will provide service to the facility. Materials and work shall be UL listed and shall meet the requirements of EUSERC and the utility company. Provide panels rated for the available short-circuit current of the electrical system. Service equipment shall be Square “D”, Cutler-Hammer, Siemens, or equal.

2.2 PANELBOARDS

- A. Lighting and power panelboards shall be circuit breaker type as indicated and shall meet the standards established by UL, NEMA PB 1, and the NEC. Provide panelboards with fully rated short-circuit current equipment ratings. Series-rated equipment ratings are not acceptable. Panels used as service entrance equipment shall have UL approval for that use. Provide copper busing.

2.3 CIRCUIT BREAKERS

- A. Circuit breakers shall be of the indicating type providing ON, TRIPPED, and OFF positions of the operating handle. Include provisions for padlocking circuit breakers in the OFF position (except in panelboards). Circuit breakers shall be quick-make, quick-break, with thermal-magnetic action. (An overload of one pole of all multiple-pole circuit breakers shall automatically cause all poles to open). Circuit breakers shall meet the requirements of UL 489. Unless noted otherwise, interrupting rating shall be not less than 10,000 amps rms symmetrical for those on low-voltage systems. Where they are used as service entrance equipment, circuit breakers shall have UL approval for that use.
- B. The use of tandem or dual circuit breakers in a normal single-pole space to provide the number of poles or spaces specified is not acceptable.
- C. GFCI (ground fault circuit interrupter) breakers shall trip in approximately 0.025 second with a ground fault of 5mA.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall be performed in a workmanlike manner by craftsmen skilled in the particular trade. Work shall be performed in accordance with the Drawings, Specifications, manufacturers' recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance. Reference items below for specific requirements.

- B. For service entrance equipment, meter base, and other related materials, obtain written approval of submittals from the serving utility before submitting to the Engineer.
- C. Install panels in compliance with seismic requirements, Authority Having Jurisdiction, and manufacturer recommendations.
- D. Provide typewritten index of all branch circuits for each panelboard.
- E. Provide phenolic nameplate.

END OF SECTION

SECTION 26 27 00 - LOW-VOLTAGE DISTRIBUTION EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers disconnect switches for this project.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for this project shall be first quality, new materials, free from any defects, in first class condition, with ratings as shown on these drawings. Disconnect shall be Square D, Cutler-Hammer or equal.

2.2 DISCONNECTING MEANS

- A. General
1. Disconnecting means, whether switches, circuit breakers, or connectors, shall be listed and rated for the intended use, shall be applied according to the recommendations of the manufacturer, and shall meet other applicable requirements of this Section.
- B. Safety Switches (Disconnect Switches)
1. Safety switches shall be UL listed, heavy duty (HD), motor rated, load break, quick-make, quick-break type meeting the requirements of NEMA KS 1.
 2. Switches shall be enclosed in suitable NEMA-rated enclosures with external operating handle lockable in the OFF position. Enclosures and switches shall be interlocked to prevent opening the cover with the switch in the ON position. Provide a defeater mechanism for this interlock.
 3. Fused switches shall be provided with current-limiting fuses and rejection clips.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall be performed in a workmanlike manner by craftsmen skilled in the particular trade. Work shall be performed in accordance with the Drawings, Specifications, manufacturers' recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance. Reference items below for specific requirements.
- B. Install disconnects in compliance with seismic requirements, Authority Having Jurisdiction, and manufacturer recommendations.
- C. Provide phenolic nameplates.
- D. Provide fuses as required.

END OF SECTION

SECTION 26 27 26 -WIRING DEVICES

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers all wiring devices for electrical system.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for this project shall be first quality, new materials free from any defects, in first class condition, with ratings shown on these Drawings.

2.2 COVERS AND DEVICE PLATES

- A. Plastic device plates shall be of one-piece ivory nylon, phenolic, or urea with smooth exterior faces, and shall have metal screws with oval heads and color matching that of the plate. Coordinate cover plate color with the Architect. Plastic device plates shall be Hubbell phenolic plates, Leviton plastic plates, or equal.
- B. Stamped steel covers and device plates shall be one-piece, and shall fit closely and tightly to the box on which they are installed. Covers shall be zinc- or cadmium-plated, with galvanized or stainless steel screws, and shall have gaskets in wet and damp locations. On surface-mounted boxes, device plates shall be raised with rounded edges and shall not extend beyond the sides of the box.
- C. Cast covers and plates shall be galvanized malleable ferrous metal with gaskets and stainless steel screws; except cast receptacle plates shall be die-cast, copper-free aluminum.
1. Cast switch plates in wet and damp locations shall have integral external operators for each switch. Plates shall be Crouse Hinds "Feralog" DS Series, Appleton malleable iron FSK Series, or equal.
 2. Cast receptacle plates in wet and damp locations shall have spring-loaded, gasketed, weatherproof covers for each receptacle. These plates shall be weatherproof when in use (with attachment plug cap inserted), as described in NEC 406.8(B). Plates shall be Thomas & Betts Red Dot Code Keeper, Carlon Weatherproof, Appleton Weatherproof, or equal.

2.3 WIRING DEVICES, RECEPTACLES, AND WALL SWITCHES

- A. General: Provide receptacles and wall switches, in suitable enclosures.
- B. Single and Duplex Convenience Receptacles: Receptacles shall be NEMA 5-15 configuration and rating (two pole, three wire, grounding, 15 amperes, 125 volts). Wire terminals shall be screw type. Receptacles shall be Hubbell 5262I, Leviton 5262I, or equal.
- C. GFCI Receptacles: Receptacles with ground fault circuit interrupters (GFCI) shall be UL listed, shall be duplex, shall have NEMA 5-15 configuration and rating, and shall fit standard-sized outlet boxes. Interrupters shall trip on a 5-mA ground fault, not on overloads, shall be capable of interrupting 1,000 amperes without damage, and shall have provision for testing. GFCI receptacles shall be Hubbell GF5262I, Leviton 6599I, or equal.
- D. Wall switches shall be totally enclosed. Operating handles shall be of ivory-colored phenolic composition. Switches shall be rated 20 amperes at 120/277 volts, 60 Hz, and shall be suitable for the control of tungsten lamp loads. Wire terminals shall be screw type. Switches shall be

UL listed.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall be performed in a workmanlike manner by craftsmen skilled in the particular trade. Work shall be performed in accordance with the Drawings, Specifications, manufacturers' recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance. Reference items below for specific requirements.
- B. Locations of electrical outlets and other electrical system components shown on Drawings are approximate unless dimensioned. Check for and resolve conflicts with openings, structural members, and equipment having fixed locations.
- C. Install all items per manufacturer recommendations, NEC, and local Building Codes.

END OF SECTION

SECTION 26 50 00 -LIGHTING

PART 1 – GENERAL

1.1 SCOPE

- A. The work under this Section covers all lighting equipment for this project.

PART 2 – PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Materials and equipment for this project shall be first quality, new materials, free from any defects, in first class condition, with ratings as shown on these Drawings.
- B. Lighting fixtures shall be of the types and sizes shown on the Drawings, and shall be furnished and installed complete with mounting devices and junction boxes where required.
- C. Fluorescent fixtures hung in continuous rows shall have wiring channels approved for use as wireways.
- D. Linear fluorescent lamps provided as new or replacement shall be TCLP (Toxicity Characteristic Leaching Procedure) compliant.

PART 3 – EXECUTION

3.1 GENERAL

- A. Work shall be performed in a workmanlike manner by craftsmen skilled in the particular trade. Work shall be performed in accordance with the Drawings, Specifications, manufacturers' recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance. Reference items below for specific requirements.
1. Locations of light fixtures and other electrical system components shown on Drawings are approximate unless dimensioned. Check for and resolve conflicts with openings, structural members, and equipment having fixed locations.
 2. Deliver lamps to the project in their original cartons. After construction of the total project is completed, wash fixtures, clean lamps, touch up any paint scratches or chips, remove labels from fixture lenses, and replace noisy ballasts.

END OF SECTION

SECTION 27 00 00 - COMMUNICATIONS CABLING

PART 1 – GENERAL REQUIREMENTS

1.01 SCOPE OF WORK- SUMMARY

- A. ONE cabling contractor is to be responsible for providing and installing ALL CABLE for Communications (Phone, Data, Paging, & CATV) and Cameras systems. Contractor quoting this section is to cable ALL systems; contractor may subcontract but is ultimately the primary party responsible for the cabling infrastructure.
- B. One contractor is to be responsible for ALL cabling for these systems since the cables will be home run from the same local closet and take the same pathway. In some cases cable medium is merged between systems.
- C. The electronics and devices for each system are NOT included in this section and are included in other specification sections or contractors designated by the owner. The contractor for this specification section is responsible for CABLING ONLY.
- D. For backbone cables the following will be installed:
 - a. A minimum 18 strands of laser enhanced 50 micron multi-mode (OM3-550) and 6 strands of water peaked single mode fiber optic cable for information transport of multiple systems (Data, VOIP, EAC etc.).
 - b. A minimum 50 pair copper from the DEMARC/MPOE to the ER rack patch panel for connection of local and site backbone cables to the PSTN lines.
 - c. A minimum 50 pair copper for the campus paging and CCTV systems from the MDF/ER to each IDF/TR.
 - d. A minimum Series 11 Coax for the CATV system from the MDF/ER to each IDF/TR.
- E. For horizontal cables the following will be installed:
 - a. Four Cat6 cables U.O.N. will be installed from the local data rack patch panel to each individual Data/Student Outlet.
 - b. One Cat6 will be installed from the local data rack patch panel to each individual Wireless Access Point (WAP) outlet (If shown on the drawings).
- F. At the station side, contractor will either terminate the cables into modular jacks and faceplates or leave a slack for termination of devices by others as instructed in this specification.
- G. At the closet side, contractor will either terminate the cables into a rack mount patch panel or 110 block.
- H. Contractor will provide and install cable tray above each rack/cabinet and around telecommunications rooms (TR) for cables entering the room.
- I. Contractor will provide and install ladder racks for cable transitioning from wall to racks/cabinets. Contractor shall use side brackets to ensure that cable will not fall off the ladder racking.
- J. Contractor will provide and install racks/cabinets, patch panels, and punch blocks.
- K. Contractor will provide and install wire management for each rack/cabinet and punch block.
- L. Contractor will provide and install blank fillers on rack/cabinets and in patch panels as instructed in this specification.

- M. Contractor will provide and install patch cords at the racks AND provide only station cords for EACH cable installed as instructed in this specification.
- N. Contractor will install owner provided switches, router, and UPS on each rack. Note: Owner will deliver the electronics to the contractor. If switches are not ready to be installed at time of delivery, contractor shall store and attain insurance. Owner will provide one UPS per rack, one switch for every 48 ports, and one router for the site.
- O. Contractor will follow installation procedures listed in the execution section of this specification to ensure best practices during installation.
- P. Contractor will complete grounding and fire stopping as instructed in this specification.
- Q. Contractor will color code and label as instructed in this specification.
- R. Contractor will provide at closeout drawings, pictures, test results, and warranty as instructed in this specification.
- S. Contractor will clean racks, fiber optic connectors, and closets as instructed in this specification.
- T. The installing contractor shall furnish and install all hardware, cables, devices, and other materials even though not specifically mentioned herein, which are necessary for the proper integration of the system so that the system shall perform the functions listed herein in compliance with all specified requirements.

1.02 ABBREVIATIONS

- A. A.P. – Access point
- B. AFF – Above the finished floor
- C. BKBRD – Backboard
- D. E.F. – Entrance Facility (formerly called MPOE or MPOP or Demarc)
- E. E.R. – Equipment Room. A building/campus serving facility connecting backbone to horizontal cabling and housing the building/campus' core system equipment.
- F. F/UTP – Foil unshielded twisted pair. This is a UTP cable with an over-all shield for the cable.
- G. ISP – Inside Plant
- H. MAC- Moves, Adds, and Changes
- I. MM – Multimode fiber
- J. NEXT – Near End Crosstalk
- K. OSP – Outside Plant
- L. REX – Request to Exit
- M. SM – Single mode fiber
- N. T.R./T.E. – Telecommunications Room/Enclosure. A floor serving facility connecting backbone and E.R. to horizontal cabling in a region on each floor.
- O. TBB – Telecommunications Bonding Backbone

- P. TGB – Telecommunications Ground Buss Bar
- Q. TMGB – Telecommunications Main Ground Buss Bar
- R. U.O.N. – Unless otherwise noted

1.03 WORK NOT INCLUDED

- A. Conduit, raceway, grommets, and electrical. Included in another section.

1.04 RELATED DOCUMENTS

- A. In addition to these specifications, the contractor shall reference the following drawings and documents:

- 1. Architectural / Engineer drawings
- 2. Detail Drawings & Diagrams
- 3. Recommended manufacturer parts lists (attachment if included on project)
- 4. Any addendum, hereafter release of specifications

- B. Contractor shall ensure that, manufacture, test, and install of the telecommunications cabling network is per manufacturer's requirements and in accordance with NFPA-70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:

- 1. Cabling Systems

- i. ANSI/TIA/EIA-568-B.1 -- Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
- ii. ANSI/TIA/EIA-568-B.2 -- Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components
- iii. ANSI/TIA/EIA-568-B.3 -- Optical Fiber Cabling Components Standard
- iv. ISO/IEC 11801:2002 ed 2 -- International standard for Class F (Cat7)
- v. IEC 61076-3-104:2002 -- International standard for RJ quad jack
- vi. ISO/IEC CD14165-114 -- International standard for duplex gigabit on two pair Ethernet
- vii. TIA TSB 155 -- 10G Ethernet over existing Cat6 up to 50 meters
- viii. ANSI/TIA/EIA 568.B.2.10 -- Standard for augmented Cat6

- 2. Pathways and Spaces

- i. ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces
- ii. ISO/IEC 18010:2002 (2002) -- Pathways and Spaces for Customer Premises Cabling

- 3. Cabling Administration

- i. ANSI/TIA/EIA-606(A) -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- ii. ISO/IEC 14763-1:1999 (1999) -- Implementation and Operation of Customer Premises Cabling, Part 1 -- Administration
- iii. TIA/EIA-942 (2005) -- Telecommunications Infrastructure Standard for Data Centers

- 4. Grounding and Bonding

- i. ANSI/TIA/EIA-607(A) -- Commercial Building Grounding and Bonding Requirements for Telecommunications
- ii. IEEE 1100 – IEEE Emerald Book
- iii. TIA/EIA-942 (2005) – Telecommunications Infrastructure Standard for Data Centers
- iv. NFPA 780 Standard for the Installation of Lightning Protection

5. Outside Plant

- i. ANSI/TIA/EIA-758(A) -- Customer-Owned Outside Plant Telecommunications Cabling Standard
- ii. ANSI/TIA-968-A – Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network

6. Cal/OSHA-Pocket Guide for the Construction Industry (recent edition)

C. Contractor must install cabling in accordance with the most recent edition of BICSI® publications:

- 1. BICSI -- Telecommunications Distribution Methods Manual (TDMM)
- 2. BICSI -- Cabling Installation Manual
- 3. BICSI – Customer-Owned Outside Plant Design Manual

D. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If the contractor shall note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the owner's representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

E. When the words “should”, “may”, “desirable”, or “will” appear in specifications, standards, and codes contractor shall replace with the word “shall” to ensure a best practice installation.

1.05 CONTRACTOR REQUIREMENTS

To qualify for installation of communications systems cabling, the contractor must have:

- A. A minimum of five years professional field experience pulling/terminating fiber and Cat6 cable and have a class 7 license with the State of California.
- B. Three references from projects of similar size and scope within the last year.
- C. At least two major manufacture certifications such as Amp, ADC, Hellerman Tyton, Leviton, Panduit, etc. These certifications shall have been in effect more than 15 days prior to the bid due date.
- D. Required insurances (General Liability, etc.) and workman's compensation.
- E. A Fluke DTX Level III tester with class F test adapters.
- F. The ability to produce drawings in VISIO 2000 or 2003 format.
- G. Compliance with Certified Payroll and Reporting for projects over \$1,000.
- H. A company safety plan and good workman's comp ratings.
- I. At least one BICSI presently certified Installer 2, Tech, or RCDD who will work on the project
- J. Installers that have been fingerprinted & cleared by the Department of Justice if working on site while children are present.

- K. The ability to provide the Panduit Integrity Warranty.

1.06 SUBMITTALS

- A. Submit eight copies of the following with divided sections.
- B. Contractor must submit documentation verifying the above qualifications listed in 1.05.
- C. Contractor must submit proof or registration with manufacturer for warranty.
- D. Contractor must submit material data sheets for items not listed on "recommended manufacturer parts lists" or in replacement of an item on the list.
- E. Contractor must submit shop drawings prior to starting installation. Architectural drawings with notes are acceptable for submittal. (If architectural drawings are submitted, contractor shall submit an example of completed as built from another project to verify the ability to create electronic as-built)
- F. The engineer's / designer's / consultant's approval of shop drawings, product data, and samples shall not relieve the contractor of responsibility for errors or omissions in such shop drawings, product data, and samples.

1.07 COORDINATION

- A. If service is to be disconnected for any reason, the contractor must make the owners technology department aware and not commence until site personnel have been notified and given permission to contractor.
- B. Shall services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service. If interruption is contractors fault there shall be no charge to owner, if another contractor is at fault that company will be invoiced for contractor's time and materials.
- C. The contractor shall coordinate and cooperate with the Owner's cabling consultant and equipment vendors for the completion of each system.

1.08 PRE-INSTALLATION CONFERENCE

- A. Schedule a conference a minimum of fifteen (15) business days PRIOR to beginning work of this Section.
- B. Agenda: Clarify questions related to work to be performed, scheduling, coordination, etc.
- C. Attendants: Communications systems installer, general contractor, owner's representatives, and other parties affected by work of this Section.
- D. A copy of warranty application shall be provided at this meeting.

1.09 WARRANTY

- A. A minimum 15 year manufacturer warranty covering all components, equipment and workmanship shall be submitted in writing with system documentation. The warranty period shall begin on the system's first use by the owner
- B. The project must be pre-registered with manufacturer before installation has begun and a copy of this application shall be included in the submittals.
- C. In addition to the manufacturer warranty, contractor shall pass through the company warranty required in the construction contract for all contractors. This is typically a period of 2 years from

acceptance.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. A single manufacturer **MUST** be used for each component
- B. Acceptable manufacturer for cable and connectivity is:
 - a. Panduit / General
 - b. Panduit / Panduit
 - c. Panduit / Corning
 - d. Corning / Corning (Fiber Only)
- C. Acceptable manufacturer for fire stop solution is Specified Technologies.
- D. Acceptable manufacturer for grounding solution is Panduit.
- E. Other components such as racks, hooks, ties, etc. are suggested throughout this specification but equivalents may be submitted.

2.02 QUANTITIES

- A. Distances mentioned and shown on drawings or spreadsheets are approximate. Field verification shall be made prior to install.
- B. Quantities listed here and in “parts lists” take precedence over drawing quantities.

2.03 SYSTEM COMPONENTS

A. Backbone Cables

- 1. Contractor shall provide and install Multi-pair Copper that meet the following specs:
 - a. Minimum 50 pair Solid copper, 24 AWG 100 Ω balanced twisted-pair cable rated Category 5 or greater
 - b. Use gel-filled duct cable or dry block cable with a PE89 rating or equal for OSP applications

NOTE: In addition to the 50 pair between buildings contractor shall install a minimum 50 pair from the DEMARC to the ER rack patch panel and label the PSTN phone numbers for patching.

B. Horizontal Cables

- 1. Contractor shall provide and install Cat6 that meets the following specs:
 - a. Solid copper, 24 AWG, 100 Ω unshielded twisted pair (UTP)
 - b. Exceeds the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2. With improved parameter performance and tested to 300 MHz (ex: GenSPEED 6000).
 - c. Use plenum rated cable in PLENUM air environments only
 - d. This cable can be installed in slab on grade.
 - e. Use OSP cable with a “thixotropic” gel that is dry, soft gel and is dermally safe and cleans easily with citrus based cleaners for applications when the cable goes outside.
 - f. See execution section for color coding
- 2. Contractor shall provide and install Augmented Cat6a U/FTP that meets the following specs:

- a. Solid bare copper, 23 AWG, 100 Ω shielded twisted pair
- b. The shield shall be U/FTP
 - i. F/UTP has an overall cable shield and unshielded pairs within – not to be used on this project
 - ii. U/FTP has no overall shield but a shield around each pair
- c. Meet or exceed the mechanical and transmission performance specifications in TIA/EIA 568-B.2-10 and ISO/IEC 11801 Edition 2.1 – to 500 Mhz
- d. Meet the internal and alien crosstalk performance requirements for 10Gig to a full 90 meters
- e. Must pass test requirements for Augmented Cat6A. A pass for 10 gig using TSB155 test parameter is not sufficient
- f. Use plenum rated cable in PLENUM air environments only
- g. F/UTP Augmented Cat6a is not available in OSP environments and shall be replaced with a Cat6 ENHANCED gel filled when going outside and the installation is less than 150 feet.
- h. This cable can be installed in slab on grade
- i. See execution section for color coding

C. Connectors

- 1. Contractor shall provide and install Cat6 Connectors that meets the following specs:
 - a. 8-pin keyed modular IDC, category6, pinned to T568B (Panduit Mini-Com CJ688TG**)
 - b. Connector shall be capable of 1 Gig
 - c. Connectors shall be angled or placed in angled faceplates at station
 - d. Install a Panduit block out module (PSL-DCJB**) in each connector at the stations. Replace the ** with the color code to match the jack color.
 - e. See execution section for colors and replace the ** with the correct color code.
 - f. The connector and cable used shall be a manufacturer connectivity solution – Panduit Integrity.
- 2. Contractor shall provide and install Augmented Cat6A Shielded Connectors that meets the following specs:
 - a. 10Gig modular shielded jack devices that house the same footprint as regular Cat6 (Panduit Mini-Com CJS6X88TGY)
 - b. 8-pin keyed modular IDC jacks for the installation of shielded cable
 - c. pinned to 568B
 - d. Install a Panduit block out module (PSL-DCJBGR - Green) in each connector at the stations
 - e. The connector and cable used shall be a manufacturer connectivity solution – Panduit Integrity.

D. Outlets

- 1. Contractor shall provide and install faceplates that meet the following specifications:
 - a) Faceplates are to be a modular with one, two, four, or six openings.
 - b) If electrician uses plastic faceplates, contractor shall match the color. Otherwise, faceplates shall be industrial white.
 - c) Faceplates shall have windows for placing labels at top and bottom of plate.
 - d) Faceplates shall be from same manufacturer as connectivity.
 - e) Faceplates shall be Panduit Classic Series sloped (CFPSL#IWY). Replace the # with how many ports.
- 2. Contractor shall provide and install raceway/floor box adapters that meet the following specifications:

- a) Contractor shall have electrician install a duplex power faceplate and use a Panduit 106 frame adapter.
- b) The frame shall accept Mini-com jacks (Panduit CF106#**Y). Replace the # with the number of ports and the ** with the color.
- c) The color of the frame shall match the raceway. If a floor box is used the frame shall be industrial white.

E. Patch Cords:

1. Contractor shall provide Copper Patch Cords that meet the following specifications:

- a) Cords for station side shall be 7ft minimum
- b) Cords for closet side shall be 3ft minimum
- c) Patch cords are to be bootless
- d) See execution section for colors
- e) Cords shall be rated Cat6 and Cat6A
- f) Cords for Augmented Cat6A shall be Shielded
- g) Contractor shall provide a cord for both sides of each of the following outlets:
 - 1. Phone
 - 2. ALL data
 - 3. CATV
 - 4. CCTV
 - 5. Ceiling
- h) Patch cord shall be from same manufacturer as connectivity.
- i) At the rack, contractor shall provide and install when patching two (2) Panduit lock-in devices (PSL-DCPL) for every patch cord. One will lock the cord into the patch panel and the other will lock the cord into the switch. The color shall match the color of the patch cord.

F. Racks and Enclosures:

1. Shown on plans.

G. Wire management:

1. Contractor shall provide and install horizontal managers that meet the following specifications:
 - a) A minimum 1RU
 - b) Above and below every 48 ports of both patch panels and switches.
 - c) Panduit WMPF1E shall be used.
2. Contractor shall provide and install spools and troughs above and below 110 and 66 blocks for management of cable and jumper wires.
3. Contractor shall provide and install black plastic D-rings for cables going vertically on the wall from conduits to the racks.

H. Cable Pathways:

1. Contractor shall provide and install cable tray that meets the following specifications:
 - a) 12" width minimum
 - b) 4" depth maximum
 - c) Cable Tray shall be basket style
 - d) Runway shall be mounted to a support loading wall
 - e) An angle transition shall be used for adjoining runways or 90 degree bends.
 - f) Splice devices shall be used to connect trays together when one continuous piece is not long enough. The splice device shall bond both trays requiring only one connection to the ground for the entire system.

- g) A cable drop shall be used to protect cables transitioning from runway to point of termination.
- 2. Contractor shall provide and install J-hooks that meets the following specifications:
 - a) Shall have a 50 cable capacity and optional mountings.
 - b) Shall have a wheel attachment capability so cables will not be dragged across during installation.
 - c) Shall ensure that bends and edges will not pinch or cut cable sheath.
 - 3. Contractor shall provide and install fire stop that meets the following specifications:
 - a) All penetrations shall utilize a metallic assembly with fire stop built into the assembly.
 - b) EZ Path mechanical fire stop by Specified Technologies meets this requirement and shall be used.
 - c) There is no absolutely no exception to this on fire rated walls shown on drawings.
 - d) If less than 24 cables are going through the wall the contractor can use EZ path series 22 (EZD22), up to 120 cables use EZ path series 33 (EZDP33FWS), and up to 240 cables use EZ path series 44.
 - e) Use the complete kit with the pathway, wall plate, positioning clamp, and labels.
 - f) All penetrations shall be labeled with a Firestop Penetration Warning Label (STI #Z1002-892-CG) and a Red Warning Label (STI #Z1003-892-CG).
 - 4. Contractor shall provide and install surge protection that meets the following specifications:
 - a) Size according to number of pairs 4-300
 - b) Use gas fuses
 - c) Use fuses that will allow PoE and power for CCTV and paging to pass through but pop with larger voltages
- I. Miscellaneous:
- 1. Contractor shall provide and install cable ties that meets the following specifications:
 - a) Velcro with a loop strap
 - b) Nylon Ties can be used during installation but shall be removed before completion. When used they shall be loose enough to place a finger between it and the cable.
 - 2. Contractor shall provide and install the following grounding kits:
 - a) Panduit ESD kit
 - b) Panduit rack grounding strip kit
 - c) Panduit equipment jumper kit
 - d) Panduit rack jumper kit
 - e) Panduit "pipe choke" kit
 - f) When building racks and mounting switches and panels use Panduit grounding washers, screws, and lug nuts (green color)
 - 3. Contractor shall provide and install labels that meets the following specifications:
 - a) Panduit Ultimate ID
 - b) Computer Laser printed
 - c) Adhesive
 - 4. Contractor shall provide and place in each closet a 4 step ladder or a 2 step ladder with extended leaning bar. This ladder shall be labeled for that room.
 - 5. Contractor shall provide and install a Safety Board in each closet with the following items mounted on the wall and accessible in case of an emergency:

- a) First Aid Kit with band aids, instant ice, gloves, gauze, tape, antiseptic, iodine, burn cream, and other items required by OSHA for a kit.
- b) Class C fire extinguisher
- c) ESD wrist strap for the ESD port
- d) Fiber cards for detecting if a fiber is active (note: cards are wavelength specific so contractor shall provide one for each wavelength available)
- e) Flashlight
- f) Fiber Cleaner (95% Isopropyl alcohol) and lint free wipes
- g) Call Button outlet for paging system
- h) A lacquer free wooden cane

PART 3 – EXECUTION

3.01 SYSTEM SPECIFIC INSTRUCTIONS

A. Backbone Cable:

1. Multi-pair copper

- a. The multi-pair copper cables going from the MDF/ER to each IDF/TR will be used for paging, clocks, and CCTV. The cables shall be terminated on 110 rack mount punch blocks in the ER and each TR.
- b. Drawings will show a quantity for each cable but contractor is responsible to confirm and include in the bid a cable that has a high enough pair count to provide the desired connectivity.
- c. Use the following formula to determine pair count: (Total number of talkback speakers X 2 pair) + (Total number of one way speakers X 1 Pair + 2 pair for power) + (Total number of clocks X 1 pair) + (Total number of fixed cameras X 1 Pair) + (Total number of PTZ cameras X 2 pair) + 30% growth = total pairs required in backbone cable.
- d. Contractor shall install the 110 rack mount punch blocks at the top of the Paging/CCTV rack in the MDF/ER. And below the fiber patch panel in each IDF/TR.
- e. Contractor shall install a 1 RU horizontal wire manager above and below each 110 rack mount frame.
- f. Pair continuity back to the head end by means of cross connects between backbone and horizontal is the responsibility of the cabling contractor. Contractor shall label the blocks and provide drawings with labels. Contractor shall cross connect the following pairs:
 - i. Audio on Speakers – Green/Green White
 - ii. Call Button - Brown/Brown White
 - iii. Clock – Blue/Blue White
 - iv. Power for one way speakers– Orange/Orange White & Blue/Blue White
 - v. CCTV Cameras – Orange/Orange White
 - vi. CCTV PTZ Controls – Brown/Brown White
- g. All cross connects shall be labeled on the 110 rack mount punch block as well as documented in the as-built.
- h. Contractor shall provide a complete copy of as-builts showing labeling and pathway to the paging and CCTV electronics contractors.
- i. Cross connects can be made between the horizontal and the site cables by means of cross connect wire or 110 to 110 patch cords. Contractor shall use the horizontal wire management above and below to create an aesthetic and accessible cross connect.
- j. See the later section for color coding of cross connect wires and/or patch cords.

2. Multi-pair copper PSTN Feed

- a. Contractor shall install next to the DEMARC a 66 block on a Green board and then provide and install a multi-pair copper from this block to a rack mount patch panel or 110 punch block.
- b. This rack mount patch panel /110 block for the PSTN phone connection shall be installed just below the fiber patch panel on the communications rack.

- c. Contractor shall label the patch panel / 110 block with the PSTN phone numbers and provide patch cords for jumpering each phone line to the appropriate horizontal jack going to an analog phone location (such as to a control panel – EAC, Paging, Intrusion, etc. – or fax line).

B. Horizontal Cable:

1. Phone and Data (Communications)

- a. Contractor shall terminate connectors using the T568B pinout.
- b. Minimize the amount of untwisting in a pair as a result of termination to connecting hardware. The amount of twisting must not exceed ½” for category 5 and higher cables. Cable sheath shall touch the back of jack after termination (leave no portion of the cable exposed).
- c. Contractor shall install a block out module into each connector for added security.
- d. Contractor shall use angled connectors or faceplates.
- e. Faceplates at work area outlets are to be modular style with up to six ports in a single gang plate.
- f. Empty ports on a faceplate are to be filled with a blank insert.
- g. Fill and label faceplates starting in the top left then moving right and downward. Place telephone jacks (if sharing the plate) in the first port then the data in the second and third ports and so forth.
- h. All stand alone wall phone locations will be at 48”AFF.
- i. Contractor shall provide a patch cord for each cable installed. One for the station and one for the rack.
- j. Provide 50% of station cables at 7 foot, 35% at 10foot, and 15% at 14 foot. Size the cables in the closet for the least amount of slack 1-7 foot.
- k. **OWNER PROVIDED CONTRACTOR INSTALLED ITEMS**
 - i. Contractor will receive and store owner provided switches, routers, UPS, phones, and brackets. Contractor shall ensure that they have insurance to cover the cost of the equipment during storage.
 - ii. Contractor will physically mount the owner provided electronics and patch the cords from the patch panels to the owner provided electronics in every closet. Contractor will also patch the phones at the station.
 - iii. Contractor will record and present to the owner an excel spreadsheet with the location and MAC address for each switch and phone.
 - iv. The owner will provide a UPS for each rack, a router for the site, a switch for every 48 ports, a phone and bracket for every classroom and wall phone location, and a phone for every admin location. The switches that the owner will provide will be Cisco 1RU in the IDF/TR and a chassis in the MDF/ER. The phones and brackets that the owner will provide will be Cisco. The UPS will be APC.
 - v. Contractor shall anticipate the installation of up to 5 additional phones for reception areas and public counters.

C. Closet / Rack Arrangement

- 1. All communications cables (voice, video, and data) shall terminate on the racks.
- 2. Typically a rack elevation will be as follows:
 - a. Fiber patch panel
 - b. Wire management
 - c. 110 Site backbone
 - d. Wire management
 - e. 110 horizontal backbone
 - f. Wire management
 - g. CATV Amplifier
 - h. Video / Data Hub (provided by electronics contractor)

- i. Wire management
 - j. 24 Port CCTV Patch Panel
 - k. 24 Port Patch Panel
 - l. Wire management
 - m. 48 port switch
 - n. Wire management
 - o. 48 port patch panel
 - p. Wire management
 - q. Repeat letters N-P as needed above and below the slide out shelf (place the slide out shelf at approximately 21RU)
 - r. Switches
 - s. UPS at bottom of rack
- 3. Contractor shall practice good industry workmanship for cabling routing and management within the telecommunications rooms. All cables shall be arranged in a neat and orderly fashion at data rack/enclosures and telecommunications closets.
 - 4. Power cords that run from the rack to the wall outlet shall be enclosed in a floor strip that will protect the wire and prevent people from tripping on the cord. (Wiremold Flexible Pancake 1200, 1400, and 1600 or equal)
 - 5. Patch cords shall route from the center of the switch then to the left and right of the switch.
 - 6. Ports on the top row of the switch shall route through the wire manager above the switch and ports on the bottom row of the switch shall route through the wire manager beneath the switch.
 - 7. Patch cords shall route into the vertical managers drop excess below the entry point in the manager then exit and into the switch from left to right meeting in the center. Contractor shall use appropriate length cords so as not to have excess beyond 6" inches in the vertical manager
 - 8. Velcro tie patch cords in groups of 4-6 cables at the patch panel, within the vertical wire manager, and at the switch.
 - 9. The patch frames shall have a point for a ground lug. Each patch panel must be grounded or contractor can use grounding washers with metal patch panels to create a bond to the rack.
 - 10. Note: unused ports on the patch frames are to be filled in with black blank inserts. Also, 2 blanks will be installed after each outlet with less than 6 cables to allow for future MACs (phones, admin, and ceiling cables will NOT have blanks after them.
 - 11. Contractor shall place drawings on the wall showing a floor plan with outlet locations, pathway, labels, and the cross connects. Labels shall match the cable and rack labels. These drawing shall show all systems. These drawings are to be laminated or in plastic casing.
 - 12. See the later sections for color codes and labeling.

3.02 INSTALLATION PROCEDURES

The following are installation practices that ensure superior performance and aesthetics.

A. Color Coding

- 1. In addition to labeling, jacks shall be quickly identifiable by color or colored icons.
 - a) The Data/Printer Jacks - Yellow
 - b) The Administration Jacks - Green
 - c) The Telephone Jack - Red
 - d) The Ceiling and WAP Jack – Brown
 - e) The CCTV Jack – Orange

- f) The FAX Jack – Black
- g) The Paging Jack – Blue
- h) The Intrusion Jack – Ivory
- i) The Fire Alarm - White
- j) Multimode fiber – Beige
- k) Singlemode fiber - Blue

2. The contractor provided station and patch cord lengths shall be quickly identifiable by color:

- a) 1foot cords shall be black
- b) 3ft (1 meter) cords shall be white
- c) 7ft (2 meter) cords shall be yellow
- d) 10ft (3 meter) cords shall be gray
- e) 14ft (5 meter) cords shall be green.
- f) Station cords shall not exceed 16 ft in length.
- g) Note: The owner also incorporates the following colors with patch cords to identify purpose.
 - a. Red for servers
 - b. Violet for uplink
 - c. Blue for cross over

3. Either the J-hooks or the cables in the pathway shall be color coded to identify purpose as follows:

- a. All Data/Printer Cables – Yellow
- b. All Admin Cables – Green
- c. All Telephone Cables - Red
- d. All Ceiling, WAP cables - White
- e. Cat6 Paging – Blue
- f. Cat6 for CCTV – Grey
- g. Multimode Fiber – Orange or Aqua
- h. Singlemode Fiber – Yellow

4. Cross connect jumper wires colors

- a. Paging System – White Blue
- b. CCTV – White Orange

5. Cross Connect Fields Blocks (Backboard) Colors

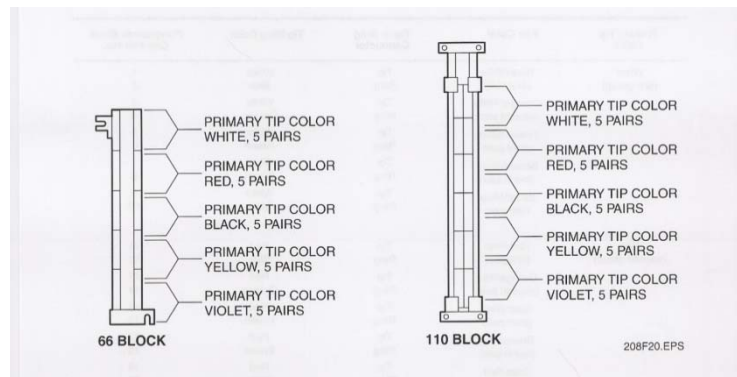
- | | |
|-----------|--------------------------------|
| a) Orange | Demarc |
| b) Green | Network |
| c) Purple | PBX |
| d) White | 1 st level backbone |
| e) Gray | 2 nd level backbone |
| f) Brown | Interbuilding backbone |
| g) Blue | Horizontal Cable |
| h) Yellow | Miscellaneous |
| i) Red | Reserved |

2. Standards Termination color code chart

	Blue	Orange	Green	Brown	Slate
White	1	2	3	4	5
Red	6	7	8	9	10
Black	11	12	13	14	15
Yellow	16	17	18	19	20
Violet	21	22	23	24	25

50 to 600 grouped by colored binders / 600+ grouped by single color super binders

Fiber = add Rose, Aqua to make 12 strands



B. Cable Pathways:

1. Acceptable Pathways:

- All horizontal cable must have support, the cable shall never be lain freely and resting on structural supports nor shall they use ceiling grid or lighting support wires.
- The pathway to the work area shall allow for a minimum of 3 cable runs per individual work area.
- If cable becomes kinked, contractor shall replace the cable.*
- Acceptable pathways (above ceiling and below floor) are: cable tray, j-hooks, conduit, and surface mount raceway.

2. While installing the pathway

- Contractor shall use a tension meter and shall not exceed 25lbs per square foot when installing cables.
- Contractor should use Rods, rollers, and bull wheels when installing cables into ceilings, in ceilings, and around corners. If the owner's representative or inspector on record inspects the install and thinks the contractor is being too rough with the cable, he can demand the installer use those tools at no extra charge.
- Contractor shall always carry reels on sides (horizontal) and carry using the rims or a rod. Never pick up cable on flat side of reel (vertical) or on the cable itself.
- Contractor shall never use cable as a hook for pull line. Use instead – Basket clamp, aramid yarn, or clove with 3 half hitches.

3. J-hooks – responsibility of cable installer

- Cables shall not be attached to ceiling grid or lighting support wires.
- Hooks shall be attached secure according to manufacturer instructions to building

structure.

- c) For large quantities of cables (50 to 75) that converge at the TR and other areas, provide trays or other special supports that are specifically designed to support the required cable weight and volume. When more than 50 cables are in a pathway j-hooks shall not be used or a second pathway shall be created.
- d) If cable tray is used follow manufacturer guidelines for installation and use a product that is designed specifically for communications cabling.
- e) When using J-hooks, locate them staggered between 3ft to 5ft to adequately support and distribute the cable's weight. Do not evenly space the hooks, vary between 3 to 5 feet between each hook to prevent signal disruption.
- f) When using J-hooks install cable with a wheel pulley system that will remove after cable is in place.
- g) Contractor shall NOT strap (or pin) the cables in between hooks to enable easier MACs and to lessen possibility of alien crosstalk.

4. Raceway and floor boxes

- a) If raceway or floor boxes are used, coordinate with electrician to have them install a duplex electrical outlet faceplate for the data outlet.
- b) If electrician uses an electrical outlet faceplate install a 4- port data receptacle adapter frame beneath the plate. If the electrician uses a GFCI electrical outlet faceplate install the data in a GFCI Designer frame beneath for the data.
- c) If electrician uses a data plate coordinate with them ensure that the plate will accept keystone jacks and change the jacks to keystone.

5. Cable Tray

- a. Shall be 6" above t-grid and 6" below the structural ceiling.
- b. Shall have a MAXIMUM 4" depth on tray for cable height. If more space is needed contractor shall extend the width of the tray.
- c. Shall install 2 levels of tray – top for copper and bottom for fiber – or install a divider to separate the fiber and the copper.

6. Conduit

- a) When pulling through conduit, cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the cable manufacturer
- b) A pull string for MACs must be pulled with cable into accessible ceiling space or length of conduit. *Label strings to indicate destination of conduit.* If conduit is full with cable a pull string does not have to be installed.
- c) Create a conduit bank chart when pulling through conduits and post on the wall in laminate or plastic casing.
- d) Inspect, clean lubricate, and ensure grommets are on BEFORE installation of cable.

7. Fill capacities

- a) Cable pathways shall not be filled greater than the NEC maximum fill for the particular pathway type
- b) The fill cable capacity for conduit shall not exceed the following:

1/2"	0 – Do not use
3/4"	0 – Do not use
1"	3
1 1/4"	4
1 1/2"	6
2"	12
2 1/2"	14
3"	20

- c) Fill capacity for raceway: (See Manufacturer Specs and Size by Cat6A requirements or .33in diameter cable)

8. Distance Limitations

- a) Premise cable distance (Outlet to Panel) is not to exceed 295ft.
- b) Premise cable distance (outlet to Panel) shall be no less than 55ft for any cable installed. slack excess in ceiling if physically closer than 55ft.
- c) Keep all telecom cables 2.5-24" from power circuits in accordance with the ANSI/NECA/BICSI 568 standard. If they must come closer run the cables perpendicular to the power.
- d) The following distance limitations for fiber are guaranteed by Cisco regardless of what fiber is used. In some instances distances will be greater. Therefore, installed fiber optic cable shall be guaranteed performance greater than these distances. Multimode fiber with an (OM3-550) meets this requirement:

**distance in meters*

1GbE transmission @ 850 / 1300nm

62.5/125 = 300 / 550

50/125 = 500 / 1000

50/125 Laser Enhanced = 750 / 600

10GbE transmission @ 850/1300nm

SM= 10-40 Km

62.5/125 = 35 / 300

50/125 = 82 / 300

50/125 Laser Enhanced = 300 / 300

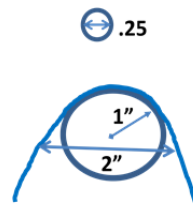
9. Aerial cable (if required)

- a) Aerial cable shall be self-supported with figure 8 guy wire built into sheath and shall be attached to lashing supports as recommended by manufacturer.
- b) Aerial entrance cable, if required, shall not span more than 100ft from the last pole to the building. To ensure proper support do not extend aerial masts more than 4" above the roof line.
- c) Cable entrance sleeves through an exterior wall must be flush with wall on outside and recessed slightly in inside of wall. The raceway shall slope downward to outside so that outward end of sleeve is 1/2" below inside end.

C. Bend Radius Limits

1. The minimum bend radius for copper cable is

- a. 4X Outside diameter (OD) for UTP
 - i. 1" Minimum for Cat 6
 - ii. 1.4" Minimum for Cat 6A
- b. 8X Outside diameter (OD) for Shielded
 - i. 2.4" Minimum for Class F
- c. 10X Outside diameter (OD) for Multi-pair co
- d. 20X Outside diameter (OD) for Fiber betwe
- e. 8X Outside diameter (OD) for Bonding Backbone



Note: The minimum is the radius, the actual bend is double (See example above)

D. EMI Avoidance

- 1. Cabling shall be installed to avoid devices that cause electromagnetic interference, such as lighting, ballasts, power panels, etc.
- 2. Telecommunications conductors shall not be routed closer than 6ft from any lightning protection system conductor.

E. Service Slack

1. Contractor shall install slack in accessible ceiling as follows:
 - a) Work area – 3 feet
 - b) Closet UTP – furthest corner using 90 degree angles + floor to ceiling
 - c) Closet fiber- furthest corner using 90 degree angles + floor to ceiling + 10'

F. Cabinets and Racks

1. The only place where cables can be bundled together with ties is from the cable tray / ladder rack to the data rack.
2. When putting cables into a bundle they shall be loose bundles and small bundles.
3. Only black Velcro cable ties shall be used for bundling and routing. Bundles shall be loose and Velcro ties shall have at least 18 inches between.
4. The service slack at the rack shall be located above the rack on the ladder rack/cable tray system or on the wall. Do not place the service slack within the vertical and horizontal wire management.
5. Entrances to cabinets shall be protected with grommets and shall have a conduit stubbed to ceiling space.
6. Wall racks and cabinets must have a backboard for support and be anchored. The backboard shall be painted to match wall color and must be fire rated.
7. 2 walls in ER shall have plywood AC grade with grade A exposed. The plywood shall have no knots or blemishes and shall be Kiln dried with 15% moisture. The size shall be 8ft high and $\frac{3}{4}$ " thick.
8. Prior to install examine the area to ensure clearance (of doors, walls, etc) when opening the door of the cabinet.
9. Floor racks must be supported in case of seismic movement and must be anchored to the floor. A four-post rack shall be used to hold equipment that is deeper than sixteen inches or excess of 50lbs. The equipment room must be a four post.
10. Racks and cabinets shall have 36" clear working space per the NEC 110.26 on all sides (front, side, and back – except wall) for maintenance.
11. All racks and cabinets shall be labeled on the front and back with an adhesive label designating its purpose (EF, ER, TR, TE, CP), its order (TR1, TR2, etc.), and link destination.
12. Ensure that the corners of wall racks and cabinets below 6ft 6" have padded or rounded corners.
13. Ensure that mounting rails within the cabinet are moved forward so that the fiber patch panel and wire managers almost touch the door when closed. This is approximately five spaces from the front.

G. Wire Management

1. Any attempt to "comb" or "cigarette pack" cable bundles must be avoided.
2. Vertical mangers in the front shall have cable spools for electronics contractor to use when routing the patch cords.
3. When bringing cable into the data rack, contractor shall keep the bundle size small (optimum size

is 12 cables and should never be more than 24 cables).

4. Feed bundles from both sides of the panel. Each patch panel shall be fed with 12 coming in from the right and then 12 coming in from the left. On the 110 blocks, contractor shall also route cables from left to right with three on each side for each row.
5. Every 48 ports of patch frame and switches must have its own wire manager below and above. The manager shall be d-rings on the front for easy access for MACs.
6. In addition to the horizontal managers, the installer shall either install a vertical d-ring manager or individual d-rings for vertical management.
7. When cable bundles transition from wall to a floor rack a ladder rack shall be utilized (black to match rack). Install brackets on sides to prevent cables from falling off the rack.

H. Fire stopping

1. All procedures in this category shall be done in accordance with authority having jurisdiction (AHJ), local codes, CEC, and insurance underwriter's requirements. If a procedure in one of these effects performance, the AHJ shall be alerted immediately in writing.
2. Ensure that materials used are U.L. or R.T.L. Listed.
3. Contractor shall provide and install EZ Path by Specified Technologies for all penetrations.
4. Contractor shall install according to manufacturer instructions and shall have the UL data sheet onsite to present when requested by owner or the IOR.
5. In addition to the inspector signature, contractor shall take a picture of every penetration to document that fire stopping was done properly. Include this picture and signature in the close out documentation. To be referenced in the future if the fire stop is tampered with or in cases of litigation.
6. Contractor shall put labels per ANSI/TIA/EIA 569 with a warning not to remove fire stop, company contact information, amount of cables total that can go in the sleeve, and date of install next to every penetration. Do this labeling before taking the picture.
7. If the installation fills the sleeve, contractor shall place a label next to it saying it is full and do not add cables.
8. If the contractor is installing cable on a retrofit, contractor shall install the EZ path around existing cables in the pathway that are not firestopped.

I. Grounding and Bonding

1. All network equipment, class F patch panels, racks, protection blocks, and tray/ladder rack segments shall be Bonded and Grounded according to TIA/EIA 607, BICSI guidelines, CEC, insurance underwriter's requirements, and local code (AHJ). The purpose is to provide a path to ground for all components to ensure personal safety and equipment protection.
2. Ensure that materials used are U.L. Listed.
3. A TMGB ground buss shall be provide at each building and a TGB ground buss or rack strip shall be provided at each TR/TE within that building.
4. The TGB or rack strip in each Telecommunications Room/Enclosure will be grounded to the TMGB (Telecommunications Main Grounding Buss) located in that building.
5. The TMGB will be bonded to building steel and grounded to the Electrical Service Ground

according to BICSI and TIA/EIA607 Guidelines.

6. The gauge of the TBB connecting ground cable will follow TIA/EIA 607 guidelines.
 - a) Less than 4 meters (13 ft) 6 AWG
 - b) 4 to 6 meters (13 to 20 ft) 4 AWG
 - c) 6 to 8 meters (20 to 26 ft) 3 AWG
 - d) 8 to 10 meters (26 to 33 ft) 2 AWG
 - e) 10 to 13 meters (33 to 44 ft) 1 AWG
 - f) 13 to 16 meters (44 to 52 ft) 1/0 AWG
 - g) 16 to 20 meters (52 to 66 ft) 2/0 AWG
 - h) Greater than 20 meters (66 ft) 3/0 AWG
7. Where making connections of grounding conductors to equipment racks or cabinets the paint at the connection point must be removed (scraped or sanded) off to ensure a positive connection between the grounding conductor and the metal frame. In the case where connections are made to pre drilled and tapped holes on equipment racks, the use of Trilobular Taptite II thread forming screws negates the need to remove surface paint manually.
8. Use The Panduit washers, screws, and lugnut painted green to show that paint has been removed.
9. When terminating grounding conductors use two hole lugs. The use of two hole lugs helps to insure that the ground connection does not become loose due to excessive vibration or movement against the attaching cable.
10. Connectors shall have inspection holes and meet NEBS Level 3. Compression connections will be achieved with appropriate compression tools and dies to achieve a UL listed crimp.
11. Conduits that contain grounding backbone conductors must be bonded to the grounding conductor at each end of the conduit. This negates the high impedance "choke" effect while the cable carries lightning currents.
12. Each equipment cabinet and open air equipment rack requires it's own grounding connection to it's respective TMGB or TGB. A minimum of a No. 6 AWG copper conductor shall be used for this purpose. The #6 AWG grounding conductor can be either bare copper or green plenum rated (Green plenum is preferred).
13. A minimum of an #6 AWG grounding conductor needs to be installed in each equipment room from the TGB to the electrical neutral bus bar in the electrical service breaker cabinet which serves AC power to the equipment racks in the respective equipment room. This insures circuit breaker operation in case of a power fault in rack-mounted equipment.
14. All racks shall utilize a full length Rack Grounding Strip attached to the rear of the side rail with Thread Forming Screws to ensure metal-to-metal contact.
15. Network elements are bonded to the Grounding Strip using a Chassis Jumper Cable with Thread Forming Screws. The jumper shall be terminated on both ends with 2 Hole, Long Barrel, Tinned Copper Compression Lugs. The jumper shall be either #10 or #6AWG Copper cable with green VW-1 rated insulation.
16. The use of aluminum conductors is discouraged in the establishment of grounding scenarios. Aluminum does not provide the lowest resistive path. Additionally, aluminum conductors can become loose from mechanical screw/bolt connections due to vibration from carrying AC current.
17. Panduit's Data Center Grounding Solution and components shall be used. The following components shall be used to form a complete system: Cabinet Grounding Complete Kit, Common Bonding Network Jumper (CBN) Kit, Surge Suppressor Jumper Kit, Front to Back Rail Jumper Kit, Rack Ground Strip Kit, Grounding Bus bar Kit, Paint Piercing Grounding Washers Kit, Thread

Forming Screws, and Electrostatic Discharge (ESD) Discharge Port Kit.

18. After installing terminating the cables into the patch panels AND BEFORE CONNECTING PATCH CORDS, contractor shall relieve the cables of any electrostatic discharge built up in the cable during installation. Contractor shall do this by cutting of one end of a patch cord and exposing the copper inside. Then plugging the terminated end into the port and touching the exposed copper side to the side of the rack or a piece of metal. This shall be done to all ports. The same patch cord can be used for all ports.
19. Contractor shall test the ground system to ensure it has less than .1 Ohms for any component. The test results shall be documented and submitted in close out docs.
20. Contractor shall test the grounding electrode using a 3 terminal earth resistance tester to ensure that the electrode is less than 10 Ohms of resistance. Contractor shall inform the owner of the rating. If the electrode is less than 10 Ohms, contractor shall notify the owner representative immediately.

3.03 TESTING

- A. Testing shall be done with a Fluke DTX cable tester. All augmented Cables shall be tested and pass both to 10gig and Augmented Cat6A standards (TIA 568B-2.10).
- B. The Augmented 6A cable shall be tested with an extended plot through to at least 900Mhz. The new Fluke DTX 1800 unit is one test set that is capable of testing all frequencies through 900 MHz. If another manufacturer provides this test, contractor shall submit spec sheets and receive written approval for the tester prior to testing.
- C. When testing fiber, contractor shall use a five-turn mandrel-wrap mode filter in accordance with TIA/EIA-455-34A.
- D. Contractor shall ensure that the tester has been calibrated within nine months of testing and has the latest software version downloaded.
- E. Prior to testing, the tester shall be set for the specific cable and jack used on the project. The tester setting shall be submitted prior to testing. If this is not done the contractor can not ask for a change order if contractor has to retest due to incorrect settings.
- F. A summary test report shall be submitted as well as a detailed report for each cable
- G. All test results shall have the individual cable label and project name in the header along with the date and time of testing.
- H. Test results must clearly indicate a Pass or Fail on the report. If a cable fails in one parameter the test is considered a Fail. *Marginal Pass cables (indicated with an asterisk) are not acceptable and will be considered as a Fail.*
- I. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner
- J. Test reports shall show a pass result for network standards, continuity, length, cross-talk, attenuation, and ambient noise.
- K. Contractor shall test fiber bi-directionally and shall test at both wavelengths when testing bi-directionally.
- L. When contractor is testing and gets a fail. The test shall be saved and submitted with a report of how the problem was fixed in the close out docs. The test result for the corrected cable shall also be submitted.

M. Confirm fiber components with an OTDR that they do not exceed the following loss limits. The printed report shall be submitted in the close out docs.

- a. Connectors = .57 db
- b. Splices = .2db

N. Optical fiber is not to exceed the following insertion loss coefficients:

- a. 50/125 & 62.5/125 850nm 2 db
- b. 50/125 & 62.5/125 1300nm 1 db
- c. Singlemode Inside Plant 1310 & 1550nm .75 db
- d. Singlemode Outside Plant 1310 & 1550nm .37 db

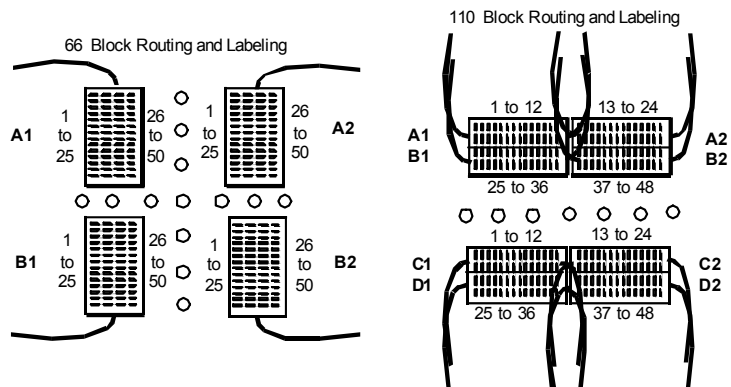
3.04 EXAMINATION / FIELD QUALITY CONTROL

- A. On a daily basis, the contractor's project manager shall inspect the installation to ensure that installers are following the specifications and quality craftsmanship
- B. Throughout the project regular, interval inspections will be completed by an owner representative to eliminate "unchangeable" installations.
- C. If the representative, inspects the site and makes a change to the design or installation, this shall be noted in writing. The contractor shall not complete this change until approval is given by the owner's technology administrator.
- D. After installation, the owner representative will first inspect the site and create a closeout punch list for contractor to complete.
- E. After completion, the representative and contractor will inspect the site together.
- F. Contractor shall have onsite and be able to provide upon request to owner the following:
 - i. Daily Job Log
 - ii. RFI Forms
 - iii. As-built drawings updated at least three days a week
 - iv. Project specifications and pertinent addendums
- G. If owner's representative, observes the contractor not following the specifications or being unsafe during the installation the owners representative will point that out to contractor. If contractor does not respond to the verbal instruction, the owner reserves the right to make contractor cease work until corrective actions are taken.

3.05 IDENTIFICATION

- A. A classic series faceplate (or surface mount box if needed) with a label window must be used or the Jack itself labeled (Easy Mark #PLL-46-Y3C-1 or equal).
- B. The labels are to be laser printed onto adhesive labels using software and labels by. Labels applied directly to the jack are permissible (Panduit Label #PLL-46-Y3C-1).
- C. Each cable is to be labeled using the following pattern: A##
 - 1. Segment A: Designates which patch panel the cable is terminated or the Rack unit # for the panel or device installed. If contractor uses the RU method show the RU for the top of the panel or device.
 - 2. Segment ##: Designates which port on the patch panel the cable is terminated.
- D. Segment A and ## shall be the same on both sides of the cable.

- E. In addition, contractor shall place labels on the patch panel indicating the first jack in each room and which room the following cables are run to. Cable labeling shall start with the teacher outlet and then go left (clockwise) around the room. On the top of each faceplate within a room a separate label should be used to indicate where the data rack is located that the jacks in the plate are home run to.
- F. Contractor is to place labels onto the faceplates and panels. In addition, contractor shall place an adhesive label on each end of the cable.
- G. Contractor shall label (and route) 110 and 66 blocks as follows:



3.06 SAFETY

- A. Contractor shall follow all OSHA guidelines for safety and be able to provide a copy of the company safety plan to owner upon request.
- B. Contractor shall use the personal protective equipment when required:
 - a. Lifting belt
 - b. Safety harness
 - c. Hearing protection
 - d. Gloves
 - e. Breathing masks and apparatus
 - f. Detection badge / exposure monitor
 - g. Hard Hats
 - h. Glasses
- C. Contractor shall wear steel toe boots at all times
- D. Contractor shall wear cotton clothing and not synthetic. Shirts shall be tucked in.
- E. Contractor shall not wear jewelry to prevent conduction and dangerous snags.
- F. Contractor shall keep hair short or in a hat.
- G. Contractor shall provide MSDS upon request of owner.

3.07 CLEANING

- A. Contractor shall clean fiber optic connectors, barrels, patch cords, and dust covers with minimum 90% isopropyl alcohol BEFORE mating and wipe dry.
- B. At the end of each work day, the contractor shall clean up waste and dispose.
- C. After punch list is complete the contractor shall clean/dust racks, cabinets, and faceplates. As well, contractor shall ensure that all excess tape and/or non-essential tags are removed.

3.08 CLOSEOUT

- A. Upon completion of the project, contractor shall train the owner how to clean the LC connectors on the front of the cartridges, the patch cords, and the MTP/MPO connectors. Contractor shall also give to the owner a fiber optic cleaning kit.
- B. Upon completion of the project, contractor shall train the owner on how to remove block out and lock in modules and shall turn over removal tools.
- C. Upon completion of the project, contractor shall train the owner on patch cord management, how to enforce warranty, and maintenance of grounding, firestop, and surge protection.
- D. After punch list is completed, the contractor shall gather all daily reports, as built drawings, and manuals/warranties from equipment to be included in closeout documentation.
- E. The contractor will then submit to owner within thirty days of completion a closeout package containing:
 - 1. Hard copy and electronic test results
 - 2. Hard copy and electronic as-built drawings. Include the following in the drawing package:
 - i. Floor plans
 - ii. Labels for outlets
 - iii. Cable pathway
 - iv. Wall penetrations
 - v. Closet floor plans with labels
 - vi. Rack elevations
 - vii. Single line diagrams
 - 3. Warranty information and manuals
 - 4. A written description of system installation
 - 5. Hard copy and electronic pictures. Include the following pictures in the package:
 - i. Firestop penetrations with labels
 - ii. Rack elevations (front and back)
 - iii. Grounding connections with labels
- F. As prerequisite to final acceptance, contractor shall have an owner chosen RCDD inspect the installation and the RCDD has to sign off on the installation verifying that it is according to owner standards.

END OF SECTION

SECTION 28 00 00 - FIRE ALARM SYSTEM

PART 1 – GENERAL REQUIREMENTS

1.01 GENERAL REQUIREMENTS: The Contractor shall provide a complete fully automatic and fully operational fire alarm system as specified herein and on the drawings in compliance with the current California Electrical Code and California Building Codes.

- A. The fire alarm system shall be a temporal code, electrically supervised, battery standby, fully addressable, smart two wire Class B system with a DACT panel.
- B. The fire alarm equipment shall have been approved and listed by the State Fire Marshal.
- C. The fire alarm system shall conform to CBC Sections 305.9 & CEC Article 760, CFC Article 10 and SB575.
- D. It is the contractor's responsibility to provide the Owner with a complete and working system that meets the intent of these specifications. Omissions in the written specifications and/or plans will not relieve the contractor of this responsibility.

1.02 The successful contractor shall have a minimum of five years experience in the field of fire alarm systems installation and service. The contractor must also have completed similar systems in the past five years.

1.03 Contractor must be a factory authorized distributor for the equipment to be installed.

1.04 The successful bidder must have a service facility within a 100 mile radius of the project. On the premises maintenance shall be provided for a period of twenty four (24) months from the date of completion of the project.

1.05 SUBMITTALS AND SUBSTITUTIONS:

A. Submittals must include:

- 1. Index, including project title, project number, scope of project and address and name of firm submitting the proposal.
- 2. Copy of authorized distributor's valid California State Contractor's License, letters of factory authorization and guarantee of service and list of projects of equal scope.
- 3. A statement by the installing contractor that the system to be provided is the one specified on the plans and specifications, including all components and devices.
- 4. Engineering data sheets on each item of the proposed system, including State Fire Marshal listing numbers as applicable. Provide an itemized equipment list as well.

B. In the event the electrical contractor proposes to substitute the specified system he shall provide detailed submittals as noted below in paragraph "C" for approval by the Engineer. Any change in the fire alarm system shall be as 'an approved equal' by the Electrical Engineer of Record.

- C. Two (2) copies of submittals shall be provided for initial review by the Engineer. Each submittal shall contain the following, minimum.
1. Index, including project title, project number, scope of project and address and name of firm submitting the proposal.
 2. Copy of authorized distributor's valid California State Contractor's license, letters of factory authorization and guarantee of service and list of projects of equal scope.
 3. Engineering data sheets on each item of the proposed system, including State Fire Marshal listing numbers as applicable. Provide an itemized equipment list as well.
 4. Overall equipment location in the form of building floor plans, with all rooms identified, to the same scale as bid drawings. Point-to-point wiring diagram. Additionally, the drawings shall also include a complete legend, describing the equipment symbols and State Fire marshal listing numbers as applicable. Provide a cable schedule. Such drawings shall be limited to fire alarm equipment only. No other systems or wiring shall be shown on these drawings.
 5. Complete Single line riser diagram for the whole system.
 6. Battery capacity calculations.
 7. Voltage drop calculations for each signal circuit.
 8. California State Fire Marshal listing sheets showing expiration date of all components of the system.
 9. Proposed anchorage detail of the fire alarm control panel.
 10. A description of operation/events that would occur when the fire alarm system is activated. This description shall be noted on the submittal drawings. Upon successful review of the initial submittal the contractor shall provide to the Architect and Engineer six (6) copies of complete submittals as noted above.
- D. The equipment specified is as manufactured by EST and is used as a standard of quality and function. Other systems will be considered, but must be submitted to the Engineer for their review and approval fifteen (15) working days prior to bid date. Prebid approval submittals shall be in writing and may require demonstration of the proposed system at the discretion of the Engineer. The prebid approval This submittal shall be set up in a format very similar to Item "C" above without point-to-point wiring diagrams. Sufficient information shall be included to make a determination on the quality of the system offered to the specified system.

PART 2 – PRODUCTS

- 2.01 The fire alarm system shall be the product of one manufacturer, EST (Edwards Systems Technology), FCI or notifier or approved equal. No other system shall be considered without prior prebid approval by the Engineer.

2.02 Equipment:

- A. Fire alarm control panel - EST3 complete with all required accessories, power supplies and battery. Surface mount. Minimum alarm initiation and signal circuit zones shall be as noted on the plans.
- B. Fire alarm annunciator
- C. Fire alarm manual pull station
- D. Fire alarm weather proof horn
- E. Fire alarm strobes
- F. Fire alarm smoke detector with 2-wire base
- G. Fire alarm heat detector
- H. Fire alarm horn
- I. Fire alarm HVAC duct smoke detector with housing. Standard Temperature and High Temperature versions.
- J. Fire alarm input module
- K. Fire alarm circuit relay
- L. Fire Alarm Digital Alarm Communicator
- M. Conduits, cables, pullboxes and all other accessories as required to provide a complete and fully functional system. All fire alarm system devices which are to be surface mounted shall be provided with compatible, red, surface box. Regular outlet boxes are not acceptable for this use.

PART 3 - EXECUTION

- 3.01 Contractor shall supply the Owner with three copies of operation and maintenance manuals, and three sets of keys required to operate or maintain system. The manual shall be bound in a 3 ring binder with instructions necessary for proper operation and servicing of the system and as-built installation drawings. The binder shall have project name/address and name and address of the installing contractor; a copy of all warranties.
- 3.02 All wiring shall be in conduit, per manufacturer's requirements. Minimum size of conduit shall be 1/2" indoors. Minimum size of underground conduit shall be 3/4". Cables shall be copper conductors with THWN insulation. Minimum sizes shall be as noted on the plans. Surface wiremold may be used indoors as noted on the plans. All conduits installed underground and on exterior surfaces of a building shall have watertight fittings.
- 3.03 **EQUIPMENT: SCOPE OF WORK/INSTALLATION:**
 - A. Provide a single control panel, complete with modules, accessories, power supply, batteries, etc. as required for the system configuration as specified. Battery capacity shall be rated minimum for 24 hours standby/5 minutes alarm. Provide a minimum of 20% spare capacity.

- B. Provide pull stations, smoke detectors, horns, horn/strobes, strobes, duct smoke detectors, heat detectors as shown on plans.
- C. Provide duct smoke detector for the supply air duct of HVAC units indicated. HVAC contractor shall mount the same and connect it into the fan shutdown control circuit. Coordinate with HVAC contractor on location and air flow capacity.

Tie each of these into the fire alarm system as a separate address.

Upon activation of a duct detector, the fire alarm system shall go into alarm and the respective air handler fan shall shut down.
- D. Interconnect smoke/fire dampers to the fire alarm system. Provide 120V power to each fire/smoke detector.
- E. Tie water flow switches, tamper switches and PIV switches to the Fire Alarm System. Provide 120V power to the Fire Sprinkler Riser Bell at every riser.
- F. Audible devices shall be at least 15dBA above average ambient sound level but not less than 75dBA at 10ft. Or more than 110dBA in total throughout. All audible devices shall produce the same basic sound and pattern. Visual devices shall not exceed 2 flash per second. All visual devices shall be fully synchronized per NFPA 72.
- G. Provide cables as required and as shown for system operation. Provide additional pull boxes, conduits, raceways as required for this. Connect all devices and the fire alarm control panel to provide a complete and fully functional single fire alarm.
- H. Upon completion of the installation of the fire alarm system, a satisfactory test of the entire system shall be made in the presence of, and witnessed by, the local Fire Authority and the Inspector of Record.
- I. Provide 3 copies of a certificate to the Architect that the fire alarm system components and system installed is in accordance with the approved plans and specifications. Such a certificate shall be signed by the Inspector, the owner's representative, and the installing Contractor. Such a certificate shall also state that the fire alarm system was tested successfully. Provide a Certificate of Completion per NFPA.
- J. See operation matrix on the plans.

END OF SECTION

SECTION 31 00 00 - EARTHWORK

PART 1. GENERAL

1.01 DESCRIPTION

- A. This section covers construction of excavations; embankments; shoring; dewatering; unsuitable subgrade removal and replacement; subgrade preparation and placement; placement, grading, and compaction of backfill materials; and all other associated work involved in excavations, embankments, grading, and engineered earthwork.
- B. Trench excavation, backfill, compaction, and all other associated work involved in trench excavations is not covered in this section. Refer to "Section 31 23 17: Trenching, Backfilling, and Compacting" and "Section 31 50 00: Excavation Support and Protection" for information and additional requirements for this type of work.

1.02 QUALITY ASSURANCE

- A. All materials shall conform to the applicable sections of the State of California Department of Transportation (Caltrans) Standard Specifications, most current edition, unless otherwise specified in these Specifications or on the Drawings. In addition, all materials testing performed to provide quality assurance shall be in accordance with "Section 01 40 00: Quality Requirements." In the event that neither of the above items is included in the Specifications for this project, the Contractor is required to provide only selected materials certificates and testing data as listed in "Section 01 33 00: Submittal Procedures" and as listed below in Paragraph 1.03.
- B. Contaminated Soil Procedure: If the Contractor or any of the Contractor's agents or employees encounters or discovers materials that appear, by visual or olfactory inspection, to contain regulated or hazardous materials (as defined by the California Environmental Protection Agency) during the performance of the Work, the Contractor shall inform the Engineer immediately and suspend work in the affected area until the Engineer has inspected the location and materials in question. If it becomes necessary to undertake remediation, the Engineer will give written notice to suspend work in the affected area until the proper course of action has been determined. Operations in the affected area shall be resumed only upon written notice by the Engineer.

1.03 SUBMITTALS

- A. Submittals shall include, but not be limited to the following items:
 - 1. Gradation curves for all aggregate material being used on the project
 - 2. Load slips for all material delivery trucks shall be delivered to the job site with the truck (The Contractor shall retain all load slips, and shall make them available to the Engineer upon request.)
 - 3. Excavation shoring and bracing plan (Refer to "Section 31 50 00: Excavation Support and Protection" for requirements of this submittal.)
 - 4. Proposed methodology of excavation and embankment for reconstruction of slopes, and any proposed embankment material substitutions
 - 5. Mix designs for slurry cement being used on the project
 - 6. Underground utility markings
- B. Utilities on the Drawings may be shown incorrectly or not at all. The Contractor shall contact Underground Service Alert at 1-800-227-2600 at least 48 hours, but not less than 2 working days, prior to any demolition or excavation and request field markings of all underground utilities.

PART 2. CONSTRUCTION MATERIALS

2.01 GENERAL

- A. Material specifications listed on the Drawings, where applicable, shall supercede those listed in this section.
- B. Drawing/Specification Coordination:
 - 1. It is the intent of the developers of these Project Documents that materials listed on the Drawings shall be named to match the materials listed in this section.
 - 2. If the Contractor encounters material named on the Drawings, and not described in this section, either during the bid or construction phases of the Project, the Contractor shall request that the material be described fully before preparing a bid or installing materials.
 - 3. The Contractor shall not make assumptions as to the specifications of any material not explicitly described in this Specification section.

2.02 NATIVE BACKFILL

Native backfill shall consist of material excavated during the course of the project, shall be free of organic and other deleterious material, with no particles greater than 6 inches in diameter, and shall have a sand equivalent (SE) greater than 15.

2.03 NATIVE TOPSOIL

Native topsoil shall consist of material excavated from the upper soil layer (from the surface to a depth of approximately 6 inches) during the course of the project. Native topsoil shall be stockpiled separately from native subsoil.

2.04 NATIVE SUBSOIL

Native subsoil shall consist of material excavated below the native topsoil (below a depth of approximately 6 inches). Native subsoil shall be stockpiled separately from native topsoil.

2.05 IMPORTED BACKFILL

Imported backfill shall closely match the composition of the material that was removed from the excavation, shall be free of organic and other deleterious material, and shall have an SE greater than 15.

2.06 IMPORTED TOPSOIL

Imported topsoil shall be sandy loam; shall be friable; shall have a high degree of fertility; and shall be free of weeds, clods, roots, rocks, gravel, sticks, brush, and other deleterious material. An imported topsoil analysis shall be submitted to the Engineer for approval prior to delivery of any imported topsoil to the project site. If the Engineer rejects any portion of the delivered soil for any reason, it shall be removed immediately at no cost to the Owner. The Contractor shall be responsible for maintaining all placed topsoil until the project has been accepted.

2.07 SLURRY CEMENT BACKFILL

- A. Slurry cement backfill shall conform to "Section 19-3.02D: Slurry Cement Backfill" of the Caltrans Standard Specifications and shall consist of a fluid, workable mixture of aggregate, cement, and water. Slurry cement backfill shall be 2-sack mix, containing 188 pounds of Portland cement per cubic yard of material.

- B. Mix type used for each specific application shall be as indicated on the Plans or as directed by the Engineer.

2.08 AGGREGATES FOR EARTHWORK

- A. All aggregates shall conform to the Caltrans Standard Specifications, latest Edition.
- B. "Base," "aggregate base," or "CL 2 ag base" shall be Class 2 aggregate base (¾-inch maximum) and shall conform to "Section 26: Aggregate Bases" of the Caltrans Standard Specifications.
- C. "RSP Energy dissipater" shall be constructed with facing rock conforming to "Section 72: Slope Protection" of the Caltrans Standard Specifications.
- D. "Facing rock" shall be facing rock conforming to "Section 72: Slope Protection" of the Caltrans Standard Specifications.
- E. "Drain rock" or "¾-inch drain rock" shall be Class 2 Permeable Material conforming to "Section 68: Subsurface Drainage" of the Caltrans Standard Specifications.
- F. "1-ton rock" shall conform to "Section 72: Slope Protection" of the Caltrans Standard Specifications.
- G. Rock-lined ditch shall be constructed with No. 3 rock conforming to "Section 72: Slope Protection" of the Caltrans Standard Specifications.
- H. "3-inch Drain Rock" shall be crushed material with 100% passing a 6-inch sieve and 5% passing a 3-inch sieve.

2.09 ENGINEERING FABRICS (GEOTEXTILE MATERIAL)

- A. Engineering fabrics used for subgrade separation, filtering, and rock slope protection applications shall conform to "Section 88: Geosynthetics" of the Caltrans Standard Specifications. Install fabrics in accordance with "Section 72: Slope Protection" of the Caltrans Standard Specifications.
- B. Drain Fields: Woven material shall be Propex 200ST, or approved equal.
- C. Rock-Lined Ditches and RSP Energy Dissipaters: Nonwoven material shall be Propex 801, or approved equal.
- D. Revetments: Nonwoven material shall be Propex 1071, or approved equal.
- E. Filter Fabric: Filter fabric shall be Propex 601, or approved equal.
- F. The Contractor shall submit material specification data on fabrics proposed to be equal.

2.10 RIVER RUN GRAVEL

River run gravel shall be 3 inches minus, well-graded, sandy gravel; free of clay balls and sticks; and with not more than 8% passing the No. 200 sieve.

2.11 PERMEABLE MATERIAL

Permeable material shall conform to Caltrans Standard Specifications, Section 68-1.025 "Permeable Material" for Class 1, Type "A."

2.12 STABILIZATION MATERIAL

Stabilization material shall be river run gravel as specified herein, unless Engineer directs otherwise.

2.13 SAND BEDDING AND COVER MATERIAL

Sand bedding and cover shall have a minimum SE of 45 and shall be uniformly graded from No. 4 to 200 mesh screen. Not more than 8% of the material shall pass the 260-mesh screen. This material shall be used for pipes 4 inches in diameter or less and electrical conduit.

2.14 STRUCTURE BACKFILL

Structure backfill to be placed at not less than 95% relative compaction and for placement behind retaining walls, and shall conform to Section 19-3.06 of Caltrans Standard Specification. It shall have a minimum SE of not less than 20. One hundred percent (100%) shall pass a 3-inch sieve, 35 to 100% shall pass a No. 4 sieve, and 20 to 100% shall pass the 30-mesh screen. It shall be free of organic matter and unsatisfactory material.

2.15 CLASS A BACKFILL

Class A backfill shall be structure backfill.

2.16 CLASS B BACKFILL

Class B backfill shall be aggregate base backfill as specified above, or approved native or imported backfill. Class B backfill shall be used along roads, streets, and surfaced travelways.

2.17 CLASS C BACKFILL

Class C backfill shall be native backfill or river run gravel, as approved by the Engineer. Class C backfill shall be used along unsurfaced or unimproved areas.

2.18 WATER FOR COMPACTION

Water shall be clean and free of oil, acids, salts, and other deleterious substances. Furnish as required.

2.19 ENGINEERING FABRICS (GEOTEXTILE MATERIAL)

- A. Engineering fabrics used for subgrade separation, filtering, and rock slope protection applications shall conform to "Section 88: Geosynthetics" of the Caltrans Standard Specifications. Install fabrics in accordance with "Section 72: Slope Protection" of the Caltrans Standard Specifications.
- B. Drain Fields: Woven material shall be Propex 200ST, or approved equal
- C. Rock-Lined Ditches and RSP Energy Dissipaters: Nonwoven material shall be Propex 801, or approved equal
- D. Revetments: Nonwoven material shall be Propex 1071, or approved equal
- E. Filter Fabric: Filter fabric shall be Propex 601, or approved equal
- F. The Contractor shall submit material specification data on fabrics proposed to be equal

PART 3. EXECUTION

3.01 CLEARING AND GRUBBING

Refer to "Section 31 11 00: Clearing and Grubbing."

3.02 STORAGE OF MATERIALS

It shall be the sole responsibility of the Contractor to store all earthwork material in a safe location out of the construction area and travelway, and in a manner that does not allow sediment to migrate into storm drains or waterways.

3.03 SHORING, SHEETING, AND BRACING

Refer to "Section 31 50 00: Excavation Support and Protection" for shoring, sheeting, and bracing requirements and submittals.

3.04 TOPSOIL REMOVAL, STOCKPILING, AND STORAGE

Prior to beginning any excavation or fill, the Contractor shall remove the topsoil and stockpile it for future use (if applicable). Stockpiled topsoil shall be stored clear of the construction area. The Contractor shall take reasonable care to prevent the topsoil from becoming mixed with subsoil.

3.05 GENERAL EXCAVATION

- A. The Contractor shall perform all excavation work required to accomplish the construction, regardless of the type, nature, or condition of material encountered. The method of excavation used is optional; however, no equipment shall be operated near existing structures or newly completed construction if such operation will endanger these structures. Excavation that cannot be accomplished using power equipment without endangering these structures, or those within 24 inches of marked underground utilities, shall be dug with hand tools.
- B. The Contractor shall complete all excavations to the elevations, lines, and grades shown on the Drawings or as shown on survey staking cut sheets provided by the Engineer or Project Surveyor. Allowances shall be made within the excavation for shoring, forms, working space, bedding, and backfill. Overexcavation below the grade lines shown on the Drawings or established by the Engineer shall be backfilled at the Contractor's sole expense with Class 2 aggregate base, compacted to 95% relative compaction (see Paragraph 3.12 below), unless otherwise directed by the Engineer (including overexcavation required to remove existing utilities shown on the Drawings as to be removed). Overexcavation required due to unsuitable subgrade soils shall be covered under Paragraph 3.07 below.
- C. The Contractor shall control excavations through careful backfill and shoring placement that prevents excavation wall sloughing, and shall remove all material that sloughs into the excavation. In addition, all voids or cavities that result from sloughing excavation walls shall be backfilled and compacted with the same material at the same compaction/vibration requirements as shown on the excavation detail for that excavation. If, in the opinion of the Engineer, additional asphalt, concrete, or other surface material must be removed to compact or vibrate the backfill placed in these voids or cavities adequately, the Contractor shall sawcut and remove the surface material to the limits of the voids or cavities as directed by the Engineer. All costs associated with the removal of material that has sloughed into the trench; placement and compaction of the additional backfill material; and the sawcutting, removal, and patching of additional surface material shall be the sole responsibility of the Contractor, and no additional payment will be made to the Contractor for this work.

3.06 EXCAVATION DEWATERING

- A. The Contractor shall provide and install sufficient means and facilities to divert, remove, and properly dispose of all water in the area of the excavation from any source, and shall maintain all work areas and excavations in a clean, dry, and safe condition.
- B. The Contractor shall dewater all excavations to keep groundwater out of the excavation. Water shall not be allowed in excavations during concrete pours, or bedding, backfill, and compaction operations. Dewatering shall be accomplished by methods that will ensure a water-free excavation, preserve the design lines and grades of the bottom of the excavations, maintain the groundwater level at least 1 foot below the excavation design grade, and prevent the loss of fines from the bottom of the excavation. Dewatering shall be a continuous 24-hours-a-day, 7-days-a-week operation until construction and backfilling are complete.
- C. If excessive groundwater is present and cannot be adequately controlled, or if "pumping" of the subgrade material occurs during compaction, the Engineer may deem the bottom of the excavation unsuitable for placement of backfill material (see Paragraph 3.07 below).

3.07 UNSUITABLE SUBGRADE EXCAVATION AND BACKFILL

- A. Unsuitable subgrade is native excavation material at subgrade that, in the opinion of the Engineer, is unsuitable to use as a subgrade layer and must be removed to provide a solid construction surface. Examples of this type of subgrade are plant material, logs, trash, wood chips and debris, mud, soft or spongy soil, and the like. It DOES NOT refer to material that sloughs into the excavation from the sidewalls due to insufficient shoring and must be dug out (see Paragraph 3.05 above). If unsuitable material is encountered at the bottom of the excavation, the Engineer shall direct the Contractor as to the total volume of unsuitable material to be removed PRIOR to its removal from the excavation.
- B. Once the unsuitable material has been excavated to the satisfaction of the Engineer, the Contractor shall backfill the overexcavation up to the elevations, lines, and grades shown on the Plans or as shown on survey staking cut sheets provided by the Engineer or Project Surveyor. Backfill material shall be Class 2 aggregate base, compacted to 95% maximum dry density of the same materials in accordance with ASTM method D1557 (see Paragraphs 3.10 and 3.12 below), unless otherwise directed by the Engineer.

If, upon overexcavation, the resulting subgrade, in the opinion of the Engineer, is still unsuitable to use as a compaction bed, the Contractor shall backfill the overexcavation up to the elevations, lines, and grades shown on the Plans or as shown on survey staking cut sheets provided by the Engineer or Project Surveyor with permeable material (see Paragraph 2.11 above), or slurry cement (see Paragraph 2.07 above), as directed by the Engineer.

3.08 SEDIMENT CONTROL

- A. All construction activities involving water, including excavation dewatering and drainage structure construction, shall have an erosion and sediment control plan (ESCP) approved by the Engineer. Sediments or turbid waters generated from any construction activities, rainfall, or other unforeseen circumstances shall not be permitted to enter into sloughs, drainage channels, creeks, or other tributaries, unless sediments are removed first. Please refer to "Section 01 57 23: Temporary Stormwater Pollution Control" for instructions on completing and submitting the ESCP.
- B. Equipment operations near wetland channels shall require installation of sediment catchment dams, offsite settling basins for pumped water with turbidity, or other equivalent methods to remove sediment in water encountered.

- C. Any bare soil areas or stockpiled soils adjacent to a drainage inlet, drainage ditch, or other watercourse shall be covered and/or surrounded with mulch, fabric, or other protective covering prior to heavy rainfall. The Contractor shall address the type of materials to be used in the ESCP.
- D. The Contractor shall address sediment management, dewatering, and bypass pumping operations in conjunction with excavation shoring and safety plans.

3.09 SUBGRADE PREPARATION

Prior to placement and compaction of embankment and road structural sections, the Contractor shall scarify, moisture condition, and re-compact the upper 8 inches of exposed native subgrade soils to a minimum 90% of the dry density of the same materials using Caltrans Tests 216 and 231.

3.10 BACKFILL

- A. Slurry cement backfill shall be consolidated using motor-driven vibrators to remove all voids and shall be placed in the work within 1 hour after mixing. The vibrator used shall be large enough to vibrate the slurry cement to the satisfaction of the Engineer. In addition, the slurry cement mixture shall contain enough water that it flows into the hole left when the vibrator is removed. Slurry material that does not flow into the hole left by the vibrator shall have water added to it in the truck in an amount sufficient to make it do so. Slurry cement shall not be covered with other material for at least 4 hours after placement.
- B. Backfill shall be placed in lifts as required to achieve required compaction. Maximum lift thickness of loose soil (before compaction) when hand-operated compaction devices are used should not exceed 6 inches, and when heavy equipment is used should not exceed 8 inches.
- C. The Contractor shall obtain the Engineer's approval of concrete work, and shall remove all trash and other debris from the excavation, prior to backfilling.
- D. The Contractor shall not operate wheeled or tracked equipment within 5 feet of the walls of concrete structures for the purpose of depositing or compacting backfill material.

3.11 EMBANKMENT CONSTRUCTION

- A. Subgrade Preparation
 - 1. After clearing and grubbing operations are completed, native soils beneath embankments shall be scarified to a minimum depth of 8 inches, and compacted to a minimum of 90% of the maximum dry density of the same material in accordance with ASTM D-1557.
Unless otherwise directed, all embankments shall be placed and compacted before any required excavation for installation of structures is performed in embankment areas. For pipelines to be installed in embankments, embankment shall be placed and compacted to a minimum of 2 feet above the top of the pipe before the pipe trench excavation will be allowed.
- B. Placing Embankment
 - 1. Embankments shall be constructed in layers of uniform thickness, and each layer shall be compacted in accordance with the requirements specified in "Section 19-6: Embankment Construction" of the Caltrans Standard Specifications, with the following two exceptions:

- a. Sidehill embankments, where the width, including bench cuts for bonding existing and new embankments, is too narrow to accommodate compacting equipment, may be constructed by end dumping when approved by the Engineer, until the embankment, including benching, is wide enough to permit the use of compacting equipment, after which the remainder of the embankment shall be placed in layers and compacted.
 - b. Where embankments are to be constructed across low, swampy ground that will not support the weight of hauling equipment, the lower part of the embankment may be constructed by dumping successive loads in a uniformly distributed layer of a thickness not greater than that necessary to support the equipment while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified.
2. Rocks, broken concrete, or other solid material that is larger than 0.33 foot in greatest dimension, shall not be placed in embankment areas where pilings are to be placed or driven. When an embankment is to be made and compacted on hillsides, where new embankment is to be compacted against existing embankments, or where embankment is built $\frac{1}{2}$ width at a time, the slopes of the original hillsides and old or new embankments shall be cut into a minimum of 6 feet horizontally as the work is brought up in layers. Material thus cut out shall be recompacted along with the new embankment material at the Contractor's expense, unless the width of excavation required by the Engineer exceeds 6 feet, in which case the excavation will be measured and paid for as excavation.
3. Where an embankment is to be made and compacted on original hillsides, old or new embankments, and end dumping is permitted, the slopes of the original ground or embankment shall be plowed or cut into before starting end dumping.
4. When an embankment is to be placed on an existing roadway, the existing roadbed shall be scarified, watered, graded, and rolled in advance of placing new material thereon.
5. Whenever selection is possible, borrow or excavation material having an SE value less than 15 shall not be placed within 2.5 feet of finished grade, and shall be placed in the lower portions of embankments.
6. Clods or hard lumps of earth more than 6 inches in greatest dimensions shall be broken up before compacting the material in the embankment, except as provided in the following paragraph.
7. Embankment material consisting of large rocky material or hard lumps (such as, hardpan or cemented gravel) that cannot be broken readily shall be well distributed throughout the embankment. Sufficient earth or other fine material shall be placed around the larger material as it is deposited so that it fills the voids and produces a dense, compact embankment.

3.12 COMPACTION OF EARTHWORK

- A. Compaction testing may be performed by the Engineer to determine if the Contractor's compaction efforts are meeting the minimum compaction requirements (see "Section 01 40 00: Quality Requirements"). Excavation backfill that fails compaction tests shall be re-compacted as necessary to meet the minimum compaction requirements at the sole expense of the Contractor.
- B. Embankments shall be constructed in layers. The loose thickness of each layer of embankment material before compaction shall not exceed 8 inches.
- C. Fill materials shall be mechanically compacted. Jetting is not allowed. Care shall be taken not to damage pipe, conduit, or other facilities with compacting equipment.
- D. Relative Compaction

1. Relative compaction of not less than 95%, per ASTM D1557, shall be obtained for a minimum depth of 6 inches below the grading plane (bottom of roadway structural section) for the width between the outer edges of shoulders, whether in excavation or embankment.
2. Relative compaction of not less than 90%, per ASTM D1557, shall be obtained in all material in embankment, except as specified herein to be 95%.

3.13 COMPACTION OF STRUCTURE BACKFILL

- A. Compaction testing, according to ASTM D1557, may be performed by the Engineer to determine if the Contractor's compaction efforts are meeting the minimum compaction requirements (see "Section 01 40 00: Quality Requirements"). Structure backfill that fails compaction tests shall be re-compacted as necessary to meet the minimum compaction requirements at the sole expense of the Contractor.
- B. All structure backfill shall be placed in layers not to exceed 8 inches, in loose thickness, before compaction.
- C. Fill materials shall be mechanically compacted. Jetting is not allowed. Care shall be taken not to damage pipe, conduit, or other facilities with compacting equipment.
- D. Backfill adjacent to concrete walls shall be compacted with hand-operated tampers or similar equipment that will not damage the structure.
- E. Structure backfill shall be compacted to a relative compaction of not less than 95%, in accordance with ASTM D1557, unless otherwise shown on the Plans or approved by the Engineer.
- F. The structural section beneath all slabs-on-grade should include a minimum of 12 inches of structural fill and 4 inches of Class II aggregate base. Areas where the site grade is on a cut, an additional 12 inches below finished grade will need to be removed and recompacted.

3.14 WORK QUALITY GUARANTEE

- A. The Contractor shall guarantee all earthwork, including excavation, embankment, backfill, and slope reconstruction work against failure for 2 years after the work has been formally accepted by the Engineer in writing, or until the Notice of Completion has been filed as specified in the contract General Provisions, whichever comes first. During this time, the Contractor shall repair, at their own expense and to the satisfaction of the Engineer, all failed earthwork excavation, backfill, reconstruction, and resurfacing.
- B. For the purpose of this contract, failure shall be deemed to have occurred if any of the following conditions exists:
 1. On paved streets, a depression in a pavement patch of 1/8-inch below the sides of the uncut portion of pavement
 2. Along shoulder areas, behind sidewalks, and in other unpaved portions of the right-of-way, a depression of 3/4 inch below the average of the sides of the uncut portion
 3. Across all fields, pastures, or areas untraveled by automotive equipment, a depression causing the ponding of water between the sides of the uncut portion
 4. Any other settlement that causes drainage problems or concentrations of water to run along the excavation line
 5. On reconstructed slopes, any irregularity or unevenness resulting in concentrations of runoff that cause or contribute to erosion of the slope (Erosion of the slope is defined as any washout or rill exceeding 2 inches in depth.)

- C. If any of these conditions exist, the Contractor shall correct the failure within a timeframe acceptable to the Owner.

END OF SECTION

SECTION 31 11 00 - CLEARING AND GRUBBING

PART 1. GENERAL

1.01 DESCRIPTION

A. Work Included

Work covered in this section consists of removing all objectionable material from the right-of-way or location of the proposed work. Clearing and grubbing shall be performed in advance of other construction operations in accordance with requirements of these Specifications.

B. Related Work

Section 31 00 00: Earthwork

Section 31 23 17: Trenching, Backfilling, and Compacting

1.02 QUALITY ASSURANCE

Provide sufficient skilled workers and supervisors who shall be present at all times during execution of this portion of the work and shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

1.03 PRESERVATION OF PROPERTY

A. Where construction is to be performed in the vicinity of trees and shrubbery, the work shall be executed in a manner that will cause minimum damage. The Engineer will designate trees that are to be removed. Under no circumstances are additional trees to be removed without written permission from the Engineer. Trees and shrubbery that are not to be removed shall be protected from injury or damage resulting from the Contractor's operations. It shall be the responsibility of the Contractor to alert their workers, suppliers, and all subcontractors of the intent of these Specifications pertaining to the protection of vegetation. During the execution of the work, the Contractor shall use the same care and protection of all vegetation within their work area.

B. In areas where trees or shrubs may be damaged by construction equipment, the Contractor shall provide protective fencing, padding on tree trunks, tie-back branches, or take other necessary actions to prevent damage to the trees, shrubs, or other vegetation.

C. Damage to trees and shrubs shall include, but will not be limited to:

1. Bark damage to trees
2. Breakage of branches on trees or shrubs
3. Breaking or tearing of roots
4. Spilling toxic materials near the root zones
5. Spraying toxic materials on foliage
6. Fire damage to foliage and branches
7. Compaction of root areas under the drip line or damage by fill or storage of materials over the root zone
8. Foot or vehicular damage on low shrubs and ground cover

D. All damage shall be immediately reported to the Engineer, who will file a report so that penalties may be determined.

E. A sum of \$100.00 per inch of diameter will be deducted from the monies due the Contractor for all trees that are removed but that are not designated to be removed or

which do not have the written authorization of the Engineer for removal. The penalty is also applicable to trees damaged to the extent that such damage will, in the Engineer's opinion, cause the tree to die.

1.04 JOB CONDITIONS

- A. Burning of any kind shall not be permitted.
- B. Contractor shall be responsible for obtaining all necessary permit(s) for disposal of material resulting from clearing and grubbing operations.

PART 3. EXECUTION

2.01 WORK REQUIRED

- A. Where required and directed by the Engineer, all trees, stumps, large roots, buried logs, decayed vegetable matter, heavy growth of grass and weeds, and all other objectionable material shall be removed from the site of work. None of the above types of material will be allowed under fills, future roadways, or within ditch sections.
- B. In areas to be grubbed, and in areas required for excavation or buried pipelines, cutoff may be made at sufficient distance from the original ground surface as will facilitate grubbing for excavation operations. In areas to be covered with roadways or selected embankment or where structures (such as, buildings, tanks, and so on) are to be constructed, tree trunks and roots shall be removed entirely.

2.02 REMOVAL AND DISPOSAL OF MATERIAL

All of the debris type material resulting from the above clearing and other miscellaneous site clearing required by the work or any excavation shall be removed from the site of the work and deposited in a location that is acceptable to the Engineer.

END OF SECTION

SECTION 31 23 17 - TRENCHING, BACKFILLING, AND COMPACTING

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities
2. Shoring and Sheeting
3. Backfilling and compaction

B. Related Sections:

Section 01 33 00:	Submittal Procedures
Section 01 40 00:	Quality Requirements
Section 01 70 00:	Execution and Closeout Requirements
Section 31 00 00:	Earthwork
Section 31 50 00:	Excavation Support and Protection
Section 32 12 16:	Asphalt Paving
Section 33 11 13:	Public Water Utility Distribution and Piping
Section 33 31 13:	Public Sanitary Utility Sewerage Piping-Gravity

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO T180:	Standard Specification for Moisture-Density Relations of Soils Using a 454-kg (10-lb) Rammer and a 457-mm (18-in) Drop
AASHTO M43:	Standard Sizes of Coarse Aggregate for Highway Construction

B. American Society for Testing and Materials-International (ASTM):

ASTM D698:	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort [12,400 ft-lbf/ft ³ (600 kN-m/m ³)]
ASTM D1556:	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557:	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lbf/ft ³ (2,700 kN-m/m ³)]
ASTM D2922:	Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D3017:	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

C. State of California, Department of Transportation Standard Specifications current revision, hereafter called "Standard Specifications."

D. Humboldt County Department of Public Works Specifications, hereafter called "County Specifications."

1.03 DEFINITIONS

Buried Utility: Any buried pipe, duct, conduit, or cable

1.04 SUBMITTALS

- A. "Section 01 33 00: Submittal Procedures": Requirements for submittals
- B. Excavation Protection Plan (Trench Safety Plan): Refer to "Section 31 50 00: Excavation Support and Protection." Describe sheeting, shoring, and bracing materials and installation required to protect personnel, excavations, and adjacent structures and property; include structural calculations to support plan. Calculations and design of shoring and sheeting included in the trench safety plan shall be stamped and signed by an Engineer presently registered in the State of California.

1.05 QUALITY ASSURANCE

Perform Work in accordance with Standard Specifications, County Specifications, and these Specifications. In the case of conflict, the most stringent shall govern. Advise the Engineer of the conflict before proceeding.

1.06 COORDINATION

Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2. PRODUCTS

2.01 FILL MATERIALS

Fill materials are indicated on the Drawings and specified in "Section 31 00 00: Earthwork"

PART 3. EXECUTION

3.01 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.

Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.02 PREPARATION

- A. Call Underground Service Alert at 1-800-227-2600 not less than 2 working days before performing Work. Request underground utilities to be located and marked within and surrounding construction areas. Notify Owner and Engineer of unanticipated conflicts before proceeding.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, rock outcropping, and other features remaining as portion of final landscaping.
- D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.

- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.03 NOTIFICATION OF SERVICE INTERRUPTION

- A. If water service to any resident or business within the work area will be interrupted during portions of the Work, the Contractor shall notify the Engineer and all affected residents and businesses at least 2 full working days in advance of anticipated water shutdowns. Unless otherwise noted on the Drawings, the maximum duration for water shutdown is 4 hours. Periods of shutdown must be between the hours of 8:00 p.m. and 6:00 a.m.

3.04 TRENCHING

- A. Excavate topsoil and subsoil required for utility installation. Stockpile topsoil separately for subsequent placement in the upper portion of the trench backfill in unpaved areas. For excavation of paved surfaces, grind or sawcut neat edge along asphalt no wider than width of trench, as shown on the Drawings.
- B. Cut trenches to width indicated on Drawings. Remove water or materials that interfere with Work.
- C. Excavate walls and bottom of trenches maximum 2 feet wider than outside diameter of pipe, or as shown in the details of the Drawings.
- D. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe and existing utilities.
- E. When subsurface materials at bottom of trench are loose, soft, or water-saturated, advise Engineer before proceeding. In the presence of the Engineer, excavate until suitable material is encountered. Backfill with stabilization material conforming to these Specifications and consolidate until a firm, unyielding surface is developed, to the satisfaction of the Engineer.
- F. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- G. Correct over-excavated areas with compacted native backfill or imported backfill.
- H. Remove excess subsoil and asphalt concrete (AC) spoils or grindings from site and properly dispose of them in accordance with local ordinance. Provide the Engineer with a written copy of the agreement between the owner of the disposal site and the Contractor and a copy of any permit(s) required for placement of this material. This agreement shall hold the Engineer, the Owner, and the Owner's representatives harmless for any issues that arise from the disposal of the trench spoils.

3.05 SHEETING AND SHORING

Submit a shoring plan for excavations greater than 5 feet in accordance with "Section 01 33 00: Submittal Procedures" and "Section 31 50 00: Excavation Support and Protection."

3.06 BACKFILLING

- A. Backfill trenches to surfaces or planes as indicated on the Drawings.
- B. Maintain optimum moisture content of fill materials to attain required compaction density.

- C. Do not leave trench open at end of working day. Backfill or place metal plates, suitable for allowable vehicular loads in traveled way, over all open excavations in the public right-of-way.
- D. Bring the upper surface of the backfilled trench to the same level as the adjoining original surface with compacted aggregate base or temporary paving if the roadway is opened for public use before placement of the final AC pavement.
- E. Provide traffic control devices, exclusionary fencing, and warning devices to prevent public entry to locations that present a danger to the public.

3.07 COMPACTING

Refer to "Section 31 00 00: Earthwork" for compaction requirements and frequency of tests.

3.08 TOLERANCES

- A. "Section 01 40 00: Quality Requirements": Tolerances
- B. Do not exceed tolerances stated in Standard Specifications Section 26-1.03D.

3.09 FIELD QUALITY CONTROL

- A. "Section 01 40 00: Quality Requirements": Field inspecting and testing
- B. Perform laboratory material tests in accordance with Standard Specifications, or ASTM as indicated by the Plans and Specifications.
- C. Perform in-place compaction tests in accordance with ASTM D6938: Standard test method for in-place density and water content of soil and soil-aggregate by nuclear methods (shallow depth)
- D. When tests indicate work does not meet specified requirements, correct the failing conditions and retest, or remove work, replace, compact, and retest. Contractor is responsible for paying for each retest required due to test failure.
- E. Frequency of Tests: In accordance with Standard Specifications or as directed by Engineer.

3.10 PROTECTION OF FINISHED WORK

- A. "Section 01 70 00: Execution and Closeout Requirements": Protecting finished work
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

PART 1. General

1.01 DESCRIPTION

- A. This section covers requirements for trench and excavation shoring and construction techniques for general safety, worker protection, and protection of adjacent property from the hazards of caving ground. These requirements include all items covered by the U.S. Department of Labor and the California Occupational Safety and Health Administration (Cal-OSHA), including, but not limited to, the following:

1. Embankment Excavations
2. Trench Excavations
3. Structure Excavations

1.02 CONTRACTOR'S RESPONSIBILITIES FOR SAFETY

- A. The Contractor shall be solely responsible for conditions of the project site, the safety of all workers and the general public, and property for the duration of the project. This responsibility shall be in effect 24 hours a day, 7 days a week.
- B. Safety provisions shall conform to U.S. Department of Labor Occupational Safety and Health Administration (OSHA); Cal-OSHA; Chapters 18, 32, and 33 of the latest edition of the Uniform Building Code as adopted by the Owner; and all other applicable federal, state, county, and local laws, ordinances, codes, the requirements set forth herein, and any other regulations detailed in other sections of these Specifications.
- C. Where conflicts are found between any of the provisions above, the more stringent requirement, as determined by the Engineer, shall be followed.

1.03 PERMITS REQUIRED

- A. The Contractor shall obtain a permit from the State Division of Industrial Safety (Cal-OSHA) for any excavation that falls under their jurisdiction, and shall file a copy of the approved permit to the Engineer prior to initiating any work covered under the permit.
- B. If the Contractor has obtained an annual permit covering the work being done, a copy of the annual permit shall be filed with the Engineer. In addition, the issuer of the permit shall be notified of the type of work being done under this Contract.

1.04 SAFETY ORDERS

The Contractor shall have, at the project site, either complete copies or suitable extracts of both the Construction Safety Orders of Cal-OSHA.

1.05 SAFETY PLAN

- A. For trenches and excavations requiring protection, the Contractor shall submit to the Engineer a detailed plan showing the proposed design of shoring, bracing, or other provisions to be made to protect the work area from caving ground.
- B. Shoring and bracing plans shall be submitted at least 10 working days before the Contractor intends to begin trenching or excavation work.
- C. If shoring and bracing plans vary from the shoring system standards established by the Construction Safety Orders, the plans shall be prepared, sealed, and signed by a Civil or

Structural Engineer currently registered in California. Signed and sealed copies of calculations necessary to qualify the system shall be included with the plans.

- D. No shoring and bracing plan shall be submitted to the Engineer that does not meet the requirements of the Construction Safety Orders of the Division of Industrial Safety.
- E. If the Contractor proposes to use trench jacks or speed shores, shoring, and bracing plans shall show the length and type of shoring, vertical and horizontal spacing, and any vertical or horizontal wales. Trench shields, when proposed or used, shall specify maximum allowed depth for the soils expected to be encountered.

1.06 ENGINEER'S REVIEW

The Engineer shall review the Contractor's shoring and bracing plans to verify the general scope of the work only. This review is not intended to include approval of the shoring system, or a review of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site. This review shall not in any way relieve the Contractor from sole responsibility for the design, construction or installation, proper maintenance, and safety of such shoring.

1.07 CONTRACTOR'S SUPERVISOR

The Contractor shall appoint a qualified supervisory employee who shall be responsible for determining the type of shoring system to be used depending on local soil type, water table, and so on. This supervisor shall have a minimum of 5 years experience in the directing of such trenching, excavation, and shoring work.

END OF SECTION

SECTION 32 12 16 -ASPHALT PAVING

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Asphalt materials
2. Aggregate materials
3. Cold Planing
4. Asphalt paving
5. Asphalt slurry seal

B. Related Requirement:

Section 31 00 00: Earthwork
Section 31 23 17: Trenching, Backfilling, and Compacting
Section 31 50 00: Excavation Support and Protection

1.02 REFERENCE STANDARDS

A. All work performed shall meet the requirements set forth in the current revision of the State of California, Department of Transportation, Standard Specifications, hereafter called "Standard Specifications":

Section 39: Hot-Mix Asphalt, "Method"
Section 26: Aggregate Bases
Section 94: Emulsified Asphalt

B. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO M17: Standard Specification for Mineral Filler for Bituminous Paving Mixtures
AASHTO M29: Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
AASHTO M320: Standard Specification for Performance-Graded Asphalt Binder

C. American Society for Testing and Materials-International (ASTM):

ASTM D242: Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D692: Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
ASTM D946: Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D1073: Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
ASTM D1188: Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
ASTM D2726: Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D3381: Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3549: Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens

1.03 SUBMITTALS

- A. Section 01 33 00: Submittal Procedures: Requirements for submittals
- B. Product Data:
 - 1. Submit product information for asphalt and aggregate materials.
 - 2. Submit mix design with laboratory test results supporting design.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- D. Submit samples for testing to the selected certified laboratory in accordance with Standard Specifications.

1.04 QUALITY ASSURANCE

- A. Mixing Plant: Conform to requirements in Standard Specifications.
- B. Obtain materials from same source throughout.
- C. Perform Work in accordance with Standard Specifications.

1.05 QUALIFICATIONS

Installer: Company specializing in performing work of this section with minimum 5 years documented experience.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. "Section 01 50 00: Temporary Facilities and Controls": Ambient conditions control facilities for product storage and installation
- B. Do not place asphalt mixture when ambient air or base surface temperature is less than 50°F, or surface is wet or frozen.
- C. Place asphalt mixture when temperature is not more than 15°F less than initial mixing temperature.

PART 2. PRODUCTS

2.01 ASPHALT PAVING

- A. Asphalt Materials: HMA Type A with ½-inch aggregate gradation in accordance with Standard Specifications, Section 39 and as amended by County Specifications.
- B. Aggregate Materials:
 - 1. Coarse Aggregate: In accordance with Standard Specifications
 - 2. Fine Aggregate: In accordance with Standard Specifications
- C. Tack Coat: Type SS-1, in accordance with Standard Specifications, Section 94
- D. Asphalt Binder: Type PG 64-16, in accordance with Standard Specifications, Section 39
- E. Permeable Pavement

1. Ensure that the porous bituminous asphalt conforms to the provisions of Section 39 of the Standard Specifications, and that the asphalt concrete is open graded asphalt, with ½-inch maximum grading. Oil shall be suitable for climatic and pavement use conditions at the site and with a minimum content of 5.5% to 6.0% in accordance with Caltrans Standard Specifications. Submit asphalt mix design from asphalt source batch plant for Engineer acceptance prior to construction. Asphalt shall be 0.3-foot thick, or as specified on the Plans.

2.02 MIXES

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Asphalt Paving Mixtures: Designed in accordance with Standard Specifications.

2.03 ASPHALT EMULSIFIER

Type SS1 emulsified asphalt, in accordance with Standard Specifications.

2.04 SOURCE QUALITY CONTROL

- A. Section 01 40 00: Quality Requirements: Testing, inspection and analysis requirements
- B. Submit samples in accordance with Standard Specifications Section 39.
- C. Test samples in accordance with Standard Specifications "Method" process.

PART 3. EXECUTION

3.01 EXAMINATION

- A. Section 01 70 00: Execution and Closeout Requirements: Requirements for installation, examination, and protection of installed work.
- B. Verify existing conditions before commencing work.
- C. Verify that utilities indicated under the area that will be paved are installed with excavations and trenches backfilled, compacted, and tested, all with passing results.
- D. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
 1. Proofroll base using a fully loaded 10-wheel dump truck with a minimum of 2 perpendicular passes to identify soft spots.
 2. Where space constraints preclude proofrolling using a truck, use hand compaction equipment to identify soft spots.
 3. Remove soft base and replace with compacted backfill as specified in "Section 31 23 17: Trenching, Backfilling, and Compacting."
- E. Verify that gradients and elevations of base are correct.
- F. Verify that valve boxes and vaults are installed in correct position and elevation. Locate facilities that will be paved over and brought to grade after placement of asphalt pavement.

3.02 COLD PLANE ASPHALT CONCRETE

- A. Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the Plans.

- B. Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.
- C. Cold planing machines shall be equipped with a cutter head not less than 30 inches in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall be equipped to control dust generated by planing operation effectively. Replace broken, missing, or worn machine teeth. The cold planing machine shall plane the pavement without requiring the use of the heating device to soften the pavement during or prior to the planing operations. The cold planing machine shall be equipped with automatic controls for longitudinal grade and transverse slope of cutter head:
 - 1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating sensor.
 - 2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.
- D. The depth, width, and shape of the cut shall be as shown on the typical cross-sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross-sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.
- E. Planed widths of pavement shall be continuous, except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 0.10 foot will not be allowed between adjacent lanes open to public traffic.
- F. Where transverse joints are planed in the pavement at conform lines, no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 20:1 (horizontal: vertical) or flatter to the level of the planed area.
- G. Asphalt concrete for temporary tapers shall be the same quality as the asphalt concrete used elsewhere on the project. Asphalt concrete for tapers shall be compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right-of-way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.
- H. Operations shall be scheduled so that not more than 10 days shall elapse between the time when transverse joints are planed in the pavement at the conform lines and the permanent surfacing is placed at the conform lines.

3.03 PREPARATION

- A. Prepare base in accordance with Drawing details and Standard Specifications.

- B. Perform final adjustment, compaction, and compaction testing of base material underlying locations of asphalt paving placement.

3.04 DEMOLITION

- A. Grind or sawcut neat edge along existing asphalt as indicted on Drawings.
- B. Remove asphalt only to width of trench shown on Drawings until pipe, cover, and base course is installed and compacted.
- C. Once base course is ready for asphalt paving, grind or sawcut neat edge to width of asphalt patch as shown on Drawings, or as directed by the Engineer. Sawcut and grind-out lines shall be perpendicular or parallel to the longitudinal axis of the paved roadway.

3.05 INSTALLATION

- A. Base:
 - 1. Aggregate Base: Install as specified in Standard Specifications, Section 26: Aggregate Bases, to dimensions and relative compaction requirements shown on Drawings.
 - 2. Prepare Base in accordance with Standard Specifications.
- B. Tack Coat:

Apply tack coat in accordance with Standard Specifications, Type SS-1, and as shown on Drawings.
- C. Single Course Asphalt Paving:
 - 1. Install Work in accordance with Standard Specifications HMA Type A.
 - 2. Construct paving by Standard Specifications "Method" process.
 - 3. Place asphalt within 24 hours of applying primer or tack coat.
 - 4. Place asphalt wearing course to thickness indicated on Drawings.
 - 5. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
 - 6. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.06 FIELD QUALITY CONTROL

- A. Section 01 40 00: Quality Requirements: Requirements for inspecting, testing.
- B. Owner will take samples and perform tests in accordance with Standard Specifications "Method" process. Coordinate with Owner for sampling and testing.
- C. Asphalt Paving Mix Temperature: Measure temperature at time of placement. Mix temperature at time of placement shall conform to the requirements of the Standard Specifications.

3.07 PROTECTION

- A. Section 01 70 00: Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from mechanical injury for 48 hours or until surface temperature is less than 140°F.

END OF SECTION

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Traffic lines and markings
2. Legends
3. Paint
4. Glass beads

B. Related Requirements:

- 5.
6. Section 01 33 00: Submittal Procedures
7. Section 01 40 00: Quality Requirements
8. Section 01 50 00: Temporary Facilities and Controls
9. Section 01 60 00: Product Requirements
10. Section 01 70 00: Execution and Closeout Requirements
11. Section 32 12 16: Asphalt Paving

1.02 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO):

- 12.
13. AASHTO M247: Standard Specification for Glass Beads Used in Traffic Paint
14. AASHTO M248: Standard Specifications for Ready-Mixed White and Yellow Traffic Paints

B. American Society for Testing and Materials-International (ASTM):

- 15.
16. ASTM D34: Standard Guide for Chemical Analysis of White Pigments
17. ASTM D126: Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green
18. ASTM D562: Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer
19. ASTM D711: Standard Test Method for No-Pick-Up Time of Traffic Paint
20. ASTM D713: Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials
21. ASTM D969: Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint
22. ASTM D1301: Standard Test Methods for Chemical Analysis of White Lead Pigments
23. ASTM D1394: Standard Test Methods for Chemical Analysis of White Titanium Pigments
24. ASTM D1475: Standard test Method for Density of Liquid Coatings, Inks, and Related Products
25. ASTM D1640: Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
26. ASTM D2202: Standard Test Method for Slump of Sealants
27. ASTM D2371: Standard Test Method for Pigment Content of Solvent-Reducible Paints
28. ASTM D2621: Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints

29. ASTM D2743: Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography

C. State of California Department of Transportation (Caltrans) Standard Specifications, current revision, herein referred to as "Standard Specifications."

1.03 SUBMITTALS

A. "Section 01 33 00: Submittal Procedures": Requirements for submittals.

B. Product Data: Submit paint formulation for each type of paint.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

D. Test and Evaluation Reports: Submit source and acceptance test results in accordance with AASHTO M247.

E. Manufacturer's Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, bead embedment and bead application rate, and any other data on proper installation.

1.04 QUALITY ASSURANCE

C. Perform Work in accordance with Standard Specifications.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 3 years documented experience.

B. Applicator: Company specializing in performing work of this section with minimum 3 years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. "Section 01 60 00: Product Requirements": Requirements for transporting, handling, storing, and protecting products.

B. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

C. Glass Beads. Store glass beads in cool, dry place. Protect from contamination by foreign substances.

1.07 AMBIENT CONDITIONS

A. "Section 01 50 00: Temporary Facilities and Controls": Ambient conditions control facilities for product storage and installation.

B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

- D. Do not apply paint when temperatures are expected to fall below 50 °F for 24 hours after application.
- E. Volatile Organic Content (VOC). Do not exceed state or EPA maximum VOC on traffic paint.

PART 2. PRODUCTS

2.01 PAINTED PAVEMENT MARKINGS

- A. Pavement Marking Paint: Alkyd-Resin type, lead and chromate free/ ready-mixed, complying with AASHTO M248, Type F.
- B. Performance/Design Criteria:
 - 1.
 - 1. Paint Adhesion: Adhere to road surface forming smooth continuous film 1 minute after application.
 - 2. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within 2 minutes after application.
- C. Glass Beads: AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.

2.02 EQUIPMENT

- A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities:
 - 2.
 - 1. Dual nozzle paint gun to apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns, simultaneously
 - 2. Pressurized bead-gun to dispense glass beads automatically onto painted surface, at required application rate
 - 3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot
 - 4. Device to heat paint to 110 °F for fast dry applications
- B. Machine Calibration:
 - 3.
 - 1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of ± 25 feet per mile.
 - 2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.
 - 3. Paint Guns: Calibrate paint binder to apply coating simultaneously at uniform rates as specified with an allowable tolerance of ± 1 mil.
 - 4. Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period. Verify weight of glass beads.
- C. Other Equipment:
 - 4. For application of crosswalks, intersections, stop lines, legends, and other miscellaneous items by walk behind strippers, hand spray, or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.03 SOURCE QUALITY CONTROL

- D. "Section 01 40 00: Quality Requirements: Testing": inspection and analysis requirements

PART 3. EXECUTION

3.01 EXAMINATION

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for installation examination
- B. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

3.02 PREPARATION

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for installation preparation
- B. Maintenance and Protection of Traffic:
1.
 1. Provide short-term traffic control in accordance with "Section 01 50 00: Temporary Facilities and Controls" and the Supplemental Conditions.
 2. Prevent interference with marking operations.
 3. Prevent traffic on newly applied markings before markings dry.
 4. Maintain access to existing businesses, residences, and other properties requiring access.
- C. Surface Preparation:
2.
 1. Clean and dry paved surface prior to painting.
 2. Blow or sweep surface free of dirt, debris, oil, grease, or gasoline.
 3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.

3.03 APPLICATION

- A. Install work in accordance with Standard Specifications and City Specifications.
- B. Apply markings to match preconstruction conditions.
- C. Prevent splattering and over spray when applying markings.
- D. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking, and apply new markings.
- E. Collect and legally dispose of residues from painting operations.

3.04 TOLERANCES

- E. Maintain tolerances in accordance with Standard Specifications, Section 84: Pavement Markings.

3.05 FIELD QUALITY CONTROL

- A. "Section 01 40 00: Quality Requirements": Requirements for inspecting, testing

- B. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- C. Repair lines and markings that, after application and curing, do not meet following criteria:
 - 1.
 - 1. Incorrect Location: Remove and replace incorrectly placed patterns.
 - 2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this section.
 - 3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this section and clean pavement surface 1 foot beyond affected area. Apply new markings on cleaned surface in accordance with this section.
- D. Replace defective pavement markings as specified throughout 1-year warranty period. Replace markings damaged by anti-skid materials, studded tires, tire chains, chemical deicers, snow plowing, or other loss of marking material regardless of cause. When markings are damaged by pavement failure or by Owner's painting, crack sealing, or pavement repair operations, Contractor is released from warranty requirements for damaged work.
- E. A 3-member team will evaluate warranty provisions. Team will consist of 1 member from Owner, 1 member from Contractor, and third person who is mutually acceptable to Owner and Contractor. Any costs for third person will be equally shared between Owner and Contractor. At least once each year, beginning with year after acceptance, team shall:
 - 2.
 - 1. Observe Owner taking readings by retroreflectometer, or review Owner records of such evaluation. The number of readings will be as large as necessary to ensure that minimum criteria are satisfied. Readings will be during period from March 15 through October, when pavement is clean and dry.
 - 2. Determine color fade, discoloration, or pigment loss based on visual color comparison between original sample plates with glass beads and in-place pavement markings.
 - 3. Determine magnitude of material loss.
- F. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require evaluation that is more detailed.
- G. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
 - 3.
 - 1. Average retroreflectivity within any 528-foot section is less than 1,225 mcd/m²/1x for white pavement markings and 100 mcd/m²/1x for yellow pavement markings
 - 2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by 3-member team based on visual comparison with beaded color plates
 - 3. More than 15% of area of continuous line, or more than 15% of combined area of skip lines, within any 528-foot section of roadway is missing
- H. Replace pavement-marking material under warranty using original or better type material. Continue warranty to end of original 1-year period even when replacement materials have been installed as specified.

- I. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16-inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any damage.

3.06 PROTECTION

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for protecting finished Work
- B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

3.07 MAINTENANCE

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for maintenance service
- B. Furnish service and maintenance of traffic paints for 1 year from date of substantial completion.

3.08 SCHEDULE

- A. Pavement Markings: See Plans.

END OF SECTION

SECTION 33 11 13 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1. GENERAL

1.01 SUMMARY

A. This section describes the piping materials required for all buried water line throughout the project.

B. Section Includes:

1. Pipe and fittings for public water main
2. Restraining devices
3. Tapping sleeves and valves
4. Underground pipe markers
5. Pressure testing of new water lines

C. Related Requirements:

Section 01 40 00:	Quality Requirements
Section 01 60 00:	Product Requirements
Section 01 70 00:	Execution and Closeout Requirements
Section 03 30 00:	Cast-In-Place Concrete
Section 31 23 17:	Trenching, Backfilling, and Compacting
Section 31 50 00:	Excavation Support and Protection
Section 33 12 16:	Water Utility Distribution Valves and Appurtenances
Section 33 13 00:	Disinfection of Water Utility Distribution Piping

1.02 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO T180: Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

B. American Society of Mechanical Engineers (ASME):

ASME B161: Cast Iron Pipe Flanges and Flanged Fittings

C. American Society for Testing and Materials-International (ASTM):

ASTM A36/A36M:	Standard Specification for Carbon Structural Steel
ASTM A123/ A123M:	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A307:	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM D698:	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³)
ASTM D1557:	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³)
ASTM D1785:	Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D2241:	Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter

ASTM D2922:	Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D3017:	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D3139:	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F477:	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

D. American Water Works Association (AWWA):

AWWA C104:	ANSI Standard for Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105:	ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110:	ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water
AWWA C111:	ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115:	ANSI Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151:	ANSI Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153:	ANSI Standard for Ductile-Iron Compact Fittings for Water Service
AWWA C153:	ANSI Standard for Ductile-Iron Compact Fittings for Water Service
AWWA C203:	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines: Enamel and Tape—Hot Applied
AWWA C205:	Cement-Mortar Protective Lining and Coating for Steel Water Pipe: 4 in. and Larger: Shop Applied
AWWA C206:	Field Welding of Steel Water Pipe
AWWA C207:	Steel Pipe Flanges for Waterworks Service: Sizes 4 in. Through 144 in.
AWWA C208:	Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C213:	Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
AWWA C500:	Gate Valves for Water and Sewage Systems
AWWA C600:	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C605:	Water Treatment—Underground Installation of Polyvinyl Chloride PVC Pressure Pipe and Fittings for Water
AWWA C606:	Grooved and Shouldered Joints
AWWA C651-05:	Disinfecting Water Mains
AWWA C700:	Cold-Water Meters—Displacement Type, Bronze Main Case
AWWA C706:	Direct-Reading, Remote-Registration Systems for Cold-Water Meters
AWWA C900:	Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 in. through 12 in., for Water Distribution
AWWA C901-08:	Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ in. through 3 in., for Water Service
AWWA M6:	Water Meters: Selection, Installation, Testing, and Maintenance

E. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):

MSS SP-60:	Connecting Flange Joint between Tapping Sleeves and Tapping Valves
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1.03 SUBMITTALS

- A. "Section 01 33 00: Submittal Procedures": Requirements for submittals
- B. Product Data: Submit data on pipe materials, pipe fittings, valves, and accessories.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- D. Hydrostatic Pressure Test Plan: Fifteen (15) calendar days before the start of pipe installation, Contractor shall submit a detailed work plan outlining the proposed procedures and schedules for pressure and leakage testing for review and approval. The submittal shall include but not be limited to:
 - 1. Pressure testing procedure including equipment to be used for testing
 - 2. Details of temporary piping to be used to fill and drain the pipeline
 - 3. Sequence of testing and disposal of water
 - 4. Source of water for testing
 - 5. Method for control and disposal of water used for testing
- E. Temporary water service connection plan (if applicable): the Contractor shall submit for review and approval a detailed plan showing the materials and layout of all temporary water service connections 15 calendar days before the start of pipe installation.

1.04 CLOSEOUT SUBMITTALS

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for submittals
- B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

- A. Valves: Mark valve body with manufacturer's name and pressure rating.
- B. All materials shall be new, of current factory manufacture (unless otherwise shown on the Plans), the product of a supplier regularly engaged in the manufacturing of pipe and water products, and guaranteed against defects or workmanship in accordance with the General Provisions, unless more stringently specified herein.

The materials and work performed in this section shall conform to the following standards:

- 1. The American National Standards Institute (ANSI)
- 2. The American Society for Testing and Materials-International (ASTM)
- 3. American Water Works Association, Inc. (AWWA)
- 4. The American Society of Mechanical Engineers, Boiler and Pressure Vessel Code (ASME)
- 5. Plumbing and Drainage Institute (PDI)
- 6. Underwriters Laboratories, Inc. (UL)
- 7. Uniform Plumbing Code (UPC)
- 8. Occupational Safety and Health Administration (OSHA)
- 9. California Department of Industrial Relations (Cal-OSHA)
- 10. The American Association of State Highway Officials (AASHTO)

- C. All materials testing performed to provide quality assurance shall be performed in accordance with requirements of the individual specification sections. The Contractor may also be required to provide selected materials certificates and testing data as listed in "Section 01 33 00: Submittal Procedures."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. "Section 01 60 00: Product Requirements": Requirements for transporting, handling, storing, and protecting products.
- B. Deliver and store valves in shipping containers with labeling in place.
- C. Block individual and stockpiled pipe lengths to prevent moving.
- D. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- E. Store polyethylene materials out of sunlight.

1.07 EXISTING CONDITIONS

Verify field measurements prior to fabrication. Indicate field measurements on Project Record Documents.

PART 2. PRODUCTS

2.01 GENERAL

- A. All materials shall be from new stock, delivered in new condition. Where no method of tests for materials is specified, the latest applicable test specified by ASTM shall be followed.
- B. Material specifications listed on the Plans, where applicable, shall supersede those listed in this section.

2.02 WATER PIPING

- A. Polyvinyl Chloride (PVC): AWWA C900, Class 235
 - 1. Fittings: AWWA C111, ductile iron
 - 2. Joints: ASTM D3139 PVC flexible elastomeric seals. Solvent-cement couplings are not permitted
- B. PVC with internal restrained joints: AWWA C900, Class 235
 - 1. Fittings: AWWA C111, ductile iron
 - 2. Joints: Solvent-cement couplings are permitted
- C. PVC, less than 3-inch diameter: ASTM D1785 Schedule 80:
 - 1. Fittings: PVC, Schedule 80
 - 2. Joints: ASTM D3139 PVC flexible elastomeric seals. Solvent-cement couplings are not permitted

2.03 TEMPORARY WATER SERVICES

All temporary service pipe material shall be Schedule 80 PVC, high density polyethylene (HDPE), or steel pipe. Schedule 40 PVC pipe is not acceptable.

2.04 TAPPING SLEEVES AND VALVES

- A. Tapping sleeves shall be manufactured by Mueller, or approved equal.
 - 1. Description: Ductile iron or cast-iron dual compression type
 - 2. Outlet Flange Dimensions and Drilling: ASME B16.1, Class 125 and MSS SP-60
- B. Tapping valves shall be manufactured by Mueller, or approved equal.
 - 1. Description: AWWA C500, resilient wedge with non-rising stem
 - 2. Inlet Flanges: ANSI B16.1, Class 125 and MSS SP-60
 - 3. Mechanical Joint Outlets: AWWA C111

2.05 VALVES AND FIRE HYDRANTS

Valves and Fire Hydrants: Conform to "Section 33 12 16: Water Utility Distribution Valves and Appurtenances."

2.06 UNDERGROUND PIPE MARKERS AND TRACE WIRE

- A. Plastic ribbon tape and trace wire shall be buried with all PVC pipe.
- B. Plastic Ribbon Tape: Blue color, minimum 6 inches wide by 4-mil thick, manufactured for direct burial service, continuously printed with the words, "Caution—Buried Water Piping."
- C. Trace Wire: Electronic detection materials for non-conductive piping products.
 - 1. 10 American Wire Gauge (AWG) copper clad steel (CCS), coated with HDPE or HMWPE, blue-insulated copper wire.
 - 2. Fasteners shall be Copperhead Snakebite.

2.07 PRECAST CONCRETE VALVE VAULTS AND METER BOXES

Precast Concrete Valve Vaults and Meter Boxes: Conform to "Section 33 12 13: Water Service Connections."

2.08 JOINT RESTRAINTS

- A. Install restrained joints as shown on Drawings.
 - 1. Installation of restrained joints is also required at pipe joints that occur within 3 feet of 11¼° or 22½° bends; within 7 feet of a 45° bend; within 16 feet of a 90° bend; within 37 feet of a dead end or inline valve. All tee joints shall have a 10-foot minimum restrained length on each run of the tee. Protect metal restrained joint components against corrosion by applying a bituminous coating.
- B. Mechanical joint restraint glands shall be Romac RomaGrip, Sigma One-Lok, or approved equal.
- C. All fittings shall be mechanical joint on both ends.

2.09 PIPE SUPPORTS AND ANCHORING

- A. Metal for pipe support brackets: Structural steel, hot-dipped galvanized thoroughly coated with bituminous paint
- B. Metal tie rods and clamps or lugs: Galvanized steel sized in accordance with NFPA 24 thoroughly coated with bituminous paint

2.10 BEDDING AND COVER MATERIALS

Pipe bedding and cover materials are specified in "Section 31 23 17: Trenching, Backfilling, and Compacting."

2.11 ACCESSORIES

- A. Concrete for Thrust Restraints: Conform to Section 03 30 00: Cast-in-Place Concrete" and Drawing Details. Minimum 28-day compressive strength of 2,500 psi.
- B. Place thrust restraints as shown on Drawings.

PART 3. EXECUTION

3.01 EXAMINATION

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for installation examination
- B. Verify that existing utility water main size, location, and inverts are as indicated on Drawings.

3.02 PREPARATION

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for installation preparation
- B. Cut pipe ends square; ream pipe and tube ends to full pipe diameter; and remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws will not be permitted. Grind edges smooth with beveled end for push-on connections.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

- A. Excavate pipe trench in accordance with "Section 31 23 17: Trenching, Backfilling, and Compacting" for Work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.
- B. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- C. Provide sheeting and shoring in accordance with "Section 31 50 00: Excavation Support and Protection."

- D. Place bedding material at trench bottom, level fill materials in 1 continuous layer not exceeding 6 inches in compacted depth; compact to 95% relative compaction.

3.04 INSTALLATION—PIPE

- A. Install pipe and fittings in accordance with AWWA C600 or AWWA C605, whichever is applicable.
- B. Handle and assemble pipe in accordance with manufacturer's instructions and as indicated on Drawings.
- C. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with 1 coat of coal tar epoxy coating before backfilling
- D. Maintain 10 feet of horizontal separation of water main from sewer piping in accordance with State of California Department of Public Health code.
- E. Maintain 4 feet of horizontal separation between potable water main and raw water piping in accordance with State of California Department of Public Health code.
- F. Maintain vertical separation of 1 foot between potable water main and other fluid carrier pipes with potable main located above in accordance with State of California Department of Public Health Code.
- G. Install pipe to indicated elevation to within tolerance of ½ inch.
- H. All water main piping fittings shall be ductile iron and shall conform to AWWA C110 or C153 for sizes 3 inches through 48 inches. Fitting sizes and end connections shall be as shown on the Plans. The interior and exterior surfaces shall be coated with a polyamide cured epoxy coating applied over a sand blasted "new white metal surface" in accordance with SSPC-SP10, to a minimum of 6 mils in compliance with AWWA C550. Nuts, bolts, and washers for mechanical joint fittings shall be stainless steel.
- I. Weld pipe in accordance with AWWA C206. Weld joints in accordance with AWWA C205.
- J. Route pipe in straight line, unless shown otherwise on Drawings. Re-lay pipe that is out of alignment or grade.
- K. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.
- L. Prevent foreign material from entering pipe during placement.
- M. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- N. Close pipe openings with watertight plugs during work stoppages.
- O. Install access fittings to permit disinfection of water system performed under "Section 33 13 00: Disinfection of Water Utility Distribution Piping."
- P. Install plastic ribbon tape continuous buried within 2 feet below finish grade, above pipeline.
- Q. Install trace wire continuous over top of pipe. Tape trace wire to top of pipe. Bring trace wire to surface at tie-in locations, valve boxes, vaults, and meter boxes, as shown on

Drawings. Positively attach trace wire to trace wire associated with existing piping, and protect with shrink wrap insulation.

3.05 INSTALLATION—VALVES AND HYDRANTS

Install valves and hydrants in accordance with “Section 33 12 16: Water Utility Distribution Valves and Appurtenances.”

3.06 INSTALLATION—TAPPING SLEEVES AND VALVES

Install tapping sleeves and valves in accordance with Drawings and in accordance with manufacturer's instructions.

3.07 POLYETHYLENE ENCASEMENT

- A. Encase valves, fittings, and underground ductile iron piping in polyethylene to prevent contact with surrounding backfill material.
- B. Install in accordance with AWWA C105.
- C. Terminate encasement 3 to 6 inches aboveground where pipe is exposed.

3.08 THRUST RESTRAINT

- A. Provide valves, tees, bends, caps, and plugs with concrete thrust blocks. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks at each elbow or change of pipe direction to resist resultant force and so pipe and fitting joints will be accessible for repair. Do not bury restraint assemblies in concrete. Provide thrust restraint bearing area on subsoil as shown in the Drawing details.
- B. Install tie rods, clamps, set screw retainer glands, or restrained joints as indicated on Drawings. Protect metal restrained joint components against corrosion by applying a spray-on type rubberized undercoating material, making sure to coat all threaded components thoroughly. Do not encase pipe and fitting joints in concrete.
- C. Install thrust blocks, tie rods, and joint restraint at dead ends of water main.

3.09 BACKFILLING

- A. Backfill around sides and to top of pipe in accordance with “Section 31 23 17: Trenching, Backfilling, and Compacting.”
- B. Maintain optimum moisture content of bedding material to attain required compaction density.

3.10 BACKFLOW PREVENTION

If the Contractor wishes to use water from McKinleyville CSD water distribution system during the course of this project, the Contractor shall obtain and attach a reduced-pressure backflow preventer valve at the point where they connect to McKinleyville's water system (that is, at a hydrant, water service, blow-off, and so on). The reduced-pressure backflow preventer valve shall be tested and certified by either a certified tester or the CSD and approved by the Engineer prior to use. The Contractor shall be responsible for the maintenance and protection of the double check valve.

3.11 PRESSURE TESTING OF NEW WATER MAINS

- A. Pressure and bacteria testing of new water mains shall be performed successfully prior to placing the new pipeline into service. Disinfection and bacteria testing is specified in "Section 33 13 00: Disinfection of Water Utility Distribution Piping."
- B. Refer to paragraph 3.10 above for backflow prevention information and requirements. Refer to paragraph 3.14 below for requirements for handling and disposing of water used for testing.
- C. The Contractor shall conduct combination hydrostatic pressure and leakage tests on all new water mains, new water services, and temporary water service piping, in accordance with AWWA C600 or C605 as applicable, and shall furnish all necessary equipment and material to complete the work, including a hydraulic force pump with a calibrated test gauge. The Engineer shall monitor the test and shall witness all gauge calibrations.
- D. On buried pipelines, the Contractor may, if field conditions permit, partially backfill the trench and leave the joints open for inspection and conduct an initial pressure test to ensure that the pipeline will pass. The acceptance test on buried water mains, however, shall only be conducted once all backfilling has been completed.
- E. On exposed water mains, the acceptance test shall be conducted after the piping has been completely installed, including all supports and hangers.
- F. The testing location and the test pressure used for the combination hydrostatic pressure and leakage tests shall be as directed by the Engineer, within the following parameters:
 - 1. Test pressure shall not be less than 150 psig at any location.
 - 2. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section.

3.12 HYDROSTATIC TESTING PROCEDURE FOR BURIED DUCTILE IRON PIPELINES

- A. After the pipeline has been installed, backfilled, and compacted, the Contractor shall conduct a combination hydrostatic pressure and leakage test of the pipeline between each valve section or pipe run, as determined by the Engineer. The pipe shall be slowly filled with water so that as much air as possible is removed, and the pipe shall be tested hydrostatically at the location and to the test pressure shown on the Plans for a minimum of 2 hours.
- B. Leakage for ductile iron pressure pipe shall not exceed the allowable leakage as calculated in AWWA C600 by the following formula:

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:

- L = allowable leakage, gallons per hour
- S = length of pipeline tested, feet
- D = nominal diameter of pipe, inches
- P = average test pressure, psig

- C. Leakage for PVC pressure pipe shall not exceed the allowable leakage as calculated in AWWA C605 by the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where:

- L = allowable leakage, gallons per hour
- S = length of pipeline tested, feet
- D = nominal diameter of pipe, inches
- P = average test pressure, psig

- D. When the pressure test is conducted against closed metal-seated valves, an additional leakage allowance of 0.0078 gal/hour/nominal valve diameter (inches) for each closed valve within the section being tested shall be made.
- E. If the pressure test discloses leakage greater than that allowed, the Contractor shall, at the Contractor's sole expense, locate and repair the defective joints until the leakage is within the specified allowance. After the defects are corrected, the pressure test shall be repeated at the location and to the test pressure shown on the Plans for a minimum of 2 hours. This process shall be repeated as necessary until the new water main passes the pressure test.

3.13 DISINFECTION OF POTABLE WATER PIPING SYSTEM

Flush and disinfect system in accordance with "Section 33 13 00: Disinfection of Water Utility Distribution Piping."

3.14 HANDLING AND DISPOSAL OF WATER

Water used for flushing and pressure testing any pipeline may be discharged into the sanitary sewer system, with written permission of the McKinleyville CSD.

3.15 FIELD QUALITY CONTROL

"Section 01 40 00: Quality Requirements" Requirements for inspecting, testing.

END OF SECTION

SECTION 33 12 13 - WATER SERVICE CONNECTIONS

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe and fittings for domestic water service connections to buildings
2. Corporation stop assembly
3. Angle stops
4. Meter setting equipment
5. Water meters
6. Backflow preventers
7. Underground pipe markers
8. Precast concrete vault
9. Bedding and cover materials

1.02 SUBMITTALS

Field Quality-Control Submittals: Required

PART 2. PRODUCTS

2.01 WATER PIPING AND FITTINGS

A. Polyethylene Pipe: AWWA C901 or ASTM D3035:

1. Fittings: AWWA C901, molded or fabricated
2. Joints: Compression or butt fusion

2.02 CORPORATION STOP ASSEMBLY

- A. Corp stops shall be AY McDonald 74704b-22.
- B. Brass or red brass alloy body conforming to ASTM B62.
- C. Inlet end threaded for tapping according to AWWA C800.
- D. Outlet end suitable for service pipe specified.
- E. Service Saddles shall be Romac 202NS, double-strap type, bronze or stainless steel.

2.03 ANGLE STOPS

Angle stops shall be AY McDonald 74602-22.

2.04 METER SETTING EQUIPMENT

A. Outside Meter Setting:

1. Meter Yokes: Copper or iron; riser-type assembly; bronze inlet; inverted key angle valve; expansion-type outlet connection; ell fitting; and flared copper tubing connections, both ends.
2. Meter Yokes: Copper or iron; inlet and outlet horizontal or vertical setting with matching couplings, fittings, and stops.

2.05 WATER METERS

- A. Water meters shall be Sensus SR 2 CUFT.
- B. AWWA C700, positive-displacement disc type suitable for fluid, with bronze case and cast iron, frost proof, breakaway, bottom cap; hermetically sealed register; with capability for modification to remote reading conforming to AWWA C706
- C. Meter: Brass body turbine meter with magnetic drive register

2.06 BACKFLOW PREVENTERS

Reduced-Pressure Backflow Preventers shall be Febco 825Y.

2.07 UNDERGROUND PIPE MARKERS

- A. Plastic ribbon tape shall be brightly colored, continuously printed, manufactured for direct burial service, printed with the words "CAUTION BURIED WATER LINE BELOW."
- B. Trace wire shall be copper clad steel (CCS) or high-strength CCS, coated with HDPE or HMWPE, fastened with Copperhead Snakebite connectors.

2.08 PRECAST CONCRETE METER BOX

- A. Description: Precast vault designed according to ASTM C858, comprising modular, interlocking sections complete with accessories.
- B. Water meter boxes shall be concrete with a self closing reading lid, and shall be:
 - 1. Christy B12 for ¾-inch to 1-inch meters (single meter installation)
 - 2. Christy B16 for 1½-inch meters (single meter installation)
 - 3. Christy B24 Dual Meter Box for ¾-inch to 1-inch meters (dual meter installation)
- C. Base Section: Include round sump with cast sleeve and ground rod openings.
- D. Top Section: Include grooved opening for frame and cover.
- E. Frames and Covers:
 - 1. ASTM A48; gray iron, machine finished with flat bearing surfaces
 - 2. Cover marked "WATER SERVICE"

2.09 PLASTIC VALVE BOX (CUSTOMER SIDE)

Plastic water valve box for private of service installation shall be Carson 809 series box, or approved equal.

2.10 MATERIALS

- A. Refer to "Section 31 00 00: Earthwork" for descriptions of bedding and cover materials.
 - 1. Bedding: Sand
 - 2. Cover: Sand

2.11 ACCESSORIES

Concrete for Thrust Restraints: Concrete type as specified in "Section 03 30 00: Cast-in-Place Concrete"

PART 3. EXECUTION

3.01 INSTALLATION

A. Corporation Stop Assembly:

1. Provide service clamps for mains other than cast-iron or ductile-iron mains.
2. For plastic pipe water mains, provide full support for service clamp for full circumference of pipe.
3. Do not backfill and cover service connection until approved by the Engineer.

B. Bedding:

Excavate pipe trench and backfill as specified in "Section 31 23 17: Trenching, Backfilling, and Compacting."

C. Pipe and Fittings:

1. Maintain separation of water main from sewer and storm drain piping according to California Department of Public Health and Humboldt County code.
2. Install pipe to allow for expansion and contraction without stressing pipe or joints.
3. Install access fittings to permit disinfection of water system performed under "Section 33 13 00: Disinfection of Public Water Utility Distribution Piping."
4. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
5. Install plastic ribbon tape and trace wire continuous above pipeline; coordinate with "Section 31 23 17: Trenching, Backfilling, and Compacting."
6. Backfill trench as specified in "Section 31 23 17: Trenching, Backfilling, and Compacting."

D. Water Meters:

Install positive displacement meters according to AWWA M6, with isolating valves on inlet and outlet, as shown on Drawings.

E. Backflow Preventers:

1. Install backflow preventer where indicated on Drawings and according to manufacturer's instructions.
2. Comply with local water company requirements and plumbing codes for testing and installation requirements.

F. Precast Concrete Vault:

1. Construct valve vaults of precast concrete.
2. Seal vault joints watertight with preformed-plastic joint sealant compound. Apply asphalt waterproofing to exterior walls.
3. Seal annular space between pipe and wall sleeves as indicated on Drawings.
4. Install vault covers and frames; adjust to finished grade elevation.

3.02 DISINFECTION OF DOMESTIC WATER PIPING

Flush and disinfect system as specified in "Section 33 13 00: Disinfection of Public Water Utility Distribution Piping."

3.03 FIELD QUALITY CONTROL

- A. Perform pressure test on domestic Site-water distribution system according to AWWA C600, as specified in "Section 33 11 13: Public Water Utility Distribution Piping."
- B. Compaction Testing for Bedding: As specified in "Section 31 00 00: Earthwork."

END OF SECTION

SECTION 33 12 16 - WATER UTILITY DISTRIBUTION VALVES AND APPURTENANCES

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Valves
2. Valve boxes
3. Hydrants
4. Reduced pressure backflow preventers

B. Related Sections:

Section 03 30 00:	Cast-In-Place Concrete
Section 31 00 00:	Earthwork
Section 31 23 17:	Trenching, Backfilling, and Compacting
Section 33 11 13:	Public Water Utility Distribution Piping
Section 33 12 13:	Water Service Connections
Section 33 13 00:	Disinfection of Water Utility Distribution Piping

1.02 REFERENCES

A. American Water Works Association (AWWA):

AWWA C500:	Metal-Seated Gate Valves for Water Supply Service
AWWA C502:	Dry-Barrel Fire Hydrants
AWWA C503:	Wet-Barrel Fire Hydrants
AWWA C509:	Resilient-Seated Gate Valves for Water-Supply Service
AWWA C550:	Protecting Epoxy Interior Coating for Valves and Hydrants
AWWA C600:	Installation of Ductile-Iron Water Mains and Their Appurtenances

B. National Sanitation Foundation (NSF):

NSF 61:	Drinking Water System Components: Health Effects
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C. National Fire Protection Association (NFPA):

NFPA 281:	Recommended Practice for Fire Flow Testing and Marking of Hydrants
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1.03 SUBMITTALS

A. Section 01 33 00: Submittals: Requirements for submittals.

B. Design Data: Submit manufacturer's latest published literature including illustrations, installation instructions, maintenance instructions, and parts lists.

C. Manufacturer's Certificates: Submit statement of compliance, supporting data from material suppliers attesting that valves, and accessories provided meet or exceed AWWA Standards and Specification requirements.

1.04 CLOSEOUT SUBMITTALS

A. Section 01 70 00: Execution and Closeout Requirements: Requirements for submittals

B. Project Record Documents: Record actual locations of valves and fire hydrants.

C. Provide operation and maintenance data for valves and fire hydrants.

1.05 QUALIFICATIONS

A. Manufacturer: company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.06 PRE-INSTALLATION MEETINGS

A. Section 01 30 00: Administrative Requirements: Pre-installation Meeting

B. Convene minimum 1 week prior to commencing work of this section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00: Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.

C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; and handle products to prevent damage to interior or exterior surfaces.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00: Product Requirements: Environmental conditions affecting products onsite

B. Conduct operations so that they do not interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.09 COORDINATION

A. Section 01 30 00: Administrative Requirements: Requirements for coordination

B. Coordinate work with McKinleyville CSD and utilities within construction area.

1.10 MAINTENANCE MATERIALS

A. Section 01 70 00: Execution and Closeout Requirements: Requirements for maintenance materials

B. Furnish 2 tee wrenches to Owner; required length.

PART 2. PRODUCTS

2.01 GATE VALVES SMALLER THAN THREE INCHES

- A. Valves shall be 125 pounds per square inch (psi), non-rising stem, handwheel operator, wedge disk, all brass or bronze valves with screwed ends. Valves shall be Crane No. 438, or equal.
- B. Use Clow C509 (2 inch-service isolation at main) with 2-inch square operation nut, or equal.

2.02 GATE VALVES THREE INCHES AND LARGER

- A. Valves shall be Clow C515, with 2-inch square operating nut.
- B. Joint materials for mechanical joint or push-on joint for cast iron pipe shall conform to AWWA C111. Joint materials for joining valves to asbestos-cement pipe shall conform to AWWA C603. Joint materials for flanged joints shall consist of 1/8 inch thick, full face, one piece, cloth inserted rubber gaskets conforming to Section 2 of AWWA C207. Bolts and nuts shall conform to Section 2 of AWWA C207.

2.03 COMBINATION AIR VALVES

Combination air valves shall be the size indicated on the Plans and shall have cast iron bodies and covers and stainless steel floats. Float guides, bushings, and lever pins shall be stainless steel or bronze. Valves shall be designed for operating service to 150 psi, and shall be Crispin C10, or equal.

2.04 CHECK VALVES SMALLER THAN THREE INCHES

Check valves smaller than 3 inches shall be 200 pound water, oil, or gas (WOG), bronze wye pattern, swing check, bronze disk, Crane No. 36, Powell Fig. 668, or equal.

2.05 CHECK VALVES THREE INCHES AND LARGER

Check valves shall be iron body, bronze mounted swing check valves with outside lever and spring and conforming to AWWA C508. Ends shall be as shown.

2.06 FIRE HYDRANTS

- A. Fire hydrants shall be 4½ inch, Clow 960 Pumper: Two 2½ inch and one 4½-inch outlet yellow, with National Standard Fire Hose Coupling threads.
- B. Breakaway flange, bolts, and nuts, no check assembly, to be supplied.
- C. Bury depths to be confirmed by the Contractor prior to order.

2.07 UTILITY HYDRANT VALVES

Valve shall be an angle valve with brass or bronze body, rated at 150 psi minimum with 1½ inch American (National) Standard fire protection outlet hose thread, and American Standard pipe inlet thread. Valve shall be Crane No. 117, Western Fire Equipment Co., No. 5T101, or equal.

2.08 REDUCED PRESSURE BACKFLOW PREVENTERS

Reduced pressure backflow preventers shall be Febco 825YD OS&Y.

2.09 VALVE BOXES

- A. Valve boxes shall be of concrete with ductile iron lid and frame so they will not be subject to traffic breakage. Covers shall be marked "water" or "sewer." Inner diameter of body at surface shall be approximately 13 inches. The lid shall rest on a machine surface and shall be equipped with "legs" that extend down into the body, 1½ inches approximately to prevent traffic flip out. Inside openings shall be approximately 9 inches. The box shall be Christy G5, or approved equal.
- B. Extensions to grade from valve box may be odd lengths of 8-inch HDPE or PVC pipe as risers. Valve box will be set in a concrete ring, approximately 24 inches in diameter upon completion.
- C. Cast iron lid marked "WATER."

2.10 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in "Section 03 30 00: Cast-in-Place Concrete."
- B. Valve Box Aligner: High-strength, plastic device designed to automatically center valve box base and prevent valve box base from shifting off center during backfilling.

PART 3. EXECUTION

3.01 EXAMINATION

- A. Section 01 30 00: Administrative Requirements: Verification of existing conditions before starting work.
- B. Determine exact location and size of valves from Drawings; obtain clarification and directions from Engineer prior to execution of work.
- C. Verify invert elevations of existing work prior to excavation and installation of valves.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
 - 1. Notify Engineer not less than 5 working days in advance of proposed utility interruption.
 - 2. Do not proceed without written permission from the Engineer.
- D. Perform trench excavation, backfilling, and compaction in accordance with "Section 31 23 17: Trenching, Backfilling, and Compacting."

3.03 INSTALLATION

- A. Install valves in conjunction with pipe laying; set valves plumb.
- B. Provide buried valves with valve boxes installed flush with finished grade.

3.04 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

Flush and disinfect system in accordance with "Section 33 13 00: Disinfection of Public Water Utility Distribution Piping."

3.05 FIELD QUALITY CONTROL

A. Section 01 40 00: Quality Requirements: Field inspecting, testing, adjusting, and balancing

B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600. Refer to "Section 33 11 13: Public Water Utility Distribution Piping."

END OF SECTION

SECTION 33 13 00 DISINFECTION OF WATER UTILITY DISTRIBUTION PIPING

PART 1. GENERAL

1.01 SUMMARY

- A. This section includes disinfection of potable water distribution and transmission system, and testing and reporting results.
- B. Related Sections:
 - Section 01 30 00: Administrative Requirements
 - Section 01 40 00: Quality Requirements
 - Section 01 70 00: Execution and Closeout Requirements
 - Section 33 11 13: Public Water Utility Distribution Piping
 - Section 33 12 16: Water Utility Distribution Valves and Appurtenances

1.02 REFERENCES

- A. American Water Works Association (AWWA)
 - AWWA B300: Hypochlorites
 - AWWA B301: Liquid Chlorine
 - AWWA B302: Ammonium Sulfate
 - AWWA B303: Sodium Chlorite
 - AWWA C600: Installation of Ductile-Iron Water Mains and Their Appurtenances
 - AWWA C651-05: Disinfecting Water Mains

1.03 SUBMITTALS

- A. "Section 01 33 00: Submittal Procedures": Requirements for submittals
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.

Disinfection and Bacteriological Test Plan: The Contractor shall submit for review and approval a detailed work plan outlining the proposed procedures and schedules for disinfection and bacteriological testing 15 calendar days before the start of pipe installation. The submittal shall include, but not be limited to:

 - 1. All aboveground sample points to be used during the disinfection and bacteriological testing period(s):
 - a. At a minimum, Contractor shall provide temporary ½-inch sample taps at each blow-off.
 - b. After the bacterial test has been passed, the temporary sample taps shall be removed, plugged, or capped.
 - 2. Details of temporary piping to be used to fill and drain the pipeline
 - 3. Sequence of flushing, disinfection, testing, and disposal activities
 - 4. Source of water flushing and disinfection
 - 5. Method for control, dechlorination, and disposal of water used for disinfection
 - 6. Sample collection, storage, and transportation procedures
- C. Certificate: Certify cleanliness of water distribution system meets or exceeds specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. "Section 01 70 00: Execution and Closeout Requirements": Requirements for submittals
- B. Disinfection Report:
 - 1. Type and form of disinfectant used
 - 2. Date and time of disinfectant injection start and time of completion
 - 3. Test locations
 - 4. Name of person collecting samples
 - 5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested
 - 6. Date and time of flushing start and completion
 - 7. Disinfectant residual after flushing, in ppm, for each outlet tested
- C. Bacteriological Report:
 - 1. Date issued; project name; and testing laboratory name, address, and telephone number
 - 2. Time and date of water sample collection
 - 3. Name of person collecting samples
 - 4. Test locations
 - 5. Initial and 24-hour disinfectant residuals, in ppm, for each outlet tested
 - 6. Coliform bacteria test results for each outlet tested
 - 7. Certify water conforms, or fails to conform, to bacterial standards of the California Department of Public Health (CDPH), Office of Drinking Water
- D. Water Quality Certificate: Certify water conforms to quality standards of the CDPH, Office of Drinking Water, suitable for human consumption.

1.05 QUALITY ASSURANCE

Perform Work in accordance with AWWA C651-05.

1.06 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum 3 years documented experience
- B. Testing Firm: Company specializing in testing potable water systems, approved by CDPH, Office of Drinking Water
- C. Submit microbiologist's signature and authority associated with testing.

PART 2. PRODUCTS

2.01 BACKFLOW PREVENTION

If the Contractor plans to use water from McKinleyville CSD's water distribution system during the course of this project, the Contractor shall obtain and attach a reduced-pressure backflow preventer valve at the point where they connect to the McKinleyville water system (that is, at a hydrant, water service, blow-off, and so on). The reduced-pressure backflow preventer valve shall be tested and certified by either a certified tester or McKinleyville's personnel and approved by the Engineer prior to use. The Contractor shall be responsible for the maintenance and protection of the double-check valve.

PART 3. EXECUTION

3.01 EXAMINATION

- A. "Section 01 30 00: Administrative Requirements": Verification of existing conditions before starting work
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting, and balancing; and demonstration procedures, including coordination with related systems.

3.02 DISINFECTING WATER MAINS

- A. Bacteria testing will be required for all new water mains and new water services that can be isolated from the existing water system and for all temporary water service pipes. Bacteria testing of other portions of the construction may be required and shall be performed as directed by the Engineer.
- B. All disinfection procedures shall be accomplished by methods approved by the Engineer in accordance with AWWA C651.
 - 1. The pressure test shall be successfully completed per the requirements "Section 33 11 13: Public Water Utility Distribution Piping," before bacteria testing may begin.
 - 2. After a successful pressure test of the new main is conducted, the system shall be chlorinated. The method of chlorination shall be approved by the Engineer in accordance with AWWA C651.
 - 3. Regardless of the chlorine introduction method that is used, the Contractor shall achieve a free chlorine residual of not less than 10 ppm for a 24-hour period. During the chlorination process, all valves within the area being tested shall be operated, unless they are attached to the CSD water distribution system.
 - 4. After successful chlorination, the chlorinated water shall be flushed from the lines at the extremities until the residual chlorine level in the new water main is equal, both chemically and bacteriologically, to that of the permanent water supply in the surrounding area. Refer to paragraph 2.01 above for backflow prevention information and requirements. Chlorinated water shall be disposed into the CSD's wastewater collection system as directed by the Engineer. Refer to paragraph 3.03 below for requirements for handling and disposing of water used for testing and disinfection.
 - 5. When disinfection and flushing have been completed, the Engineer shall arrange with the CSD wastewater personnel for bacteria tests on the new main. If any bacteria test fails, the main shall be chlorinated and flushed again, and the bacteria test, repeated. This process shall be repeated as necessary at the sole expense of the Contractor until the new water main passes the bacteria test.

3.03 HANDLING AND DISPOSAL OF WATER

- A. Water used for disinfection and chlorinated water drained from any pipeline shall not be directly discharged to the ground or into a watercourse. This water may be discharged to temporary basins or to the sanitary sewer system, with permission of the CSD. Temporary discharge basins shall be a minimum of 100 feet from any surface waters or storm drain.
- B. No water shall be discharged to the sanitary sewer system with a chlorine residual greater than 0.5 milligrams per liter. Contractor shall monitor the water prior to discharge

to ensure that this criterion is met. A dechlorination facility or mechanism shall be provided as necessary to meet this requirement. Holding tanks or ponds shall be a minimum of 100 feet from any surface waters and shall be removed immediately after use.

- C. As described in paragraph 1.03 above, Contractor shall describe the proposed methods and locations of discharge, including erosion control if necessary, dechlorination, and chlorine residual monitoring in the Contractor's test plans for testing and disinfection.
- D. Contractor shall be responsible for all costs, including fines and legal fees, resulting from the improper handling and disposal of water.

3.04 FIELD QUALITY CONTROL

"Section 01 40 00: Quality Requirements": Testing and Inspection Services

END OF SECTION

SECTION 33 31 13 -PUBLIC SANITARY UTILITY SEWERAGE PIPING--GRAVITY

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sanitary sewer pipe and fittings
2. Underground pipe markers
3. Connection to existing manholes
4. Wye branches and tees
5. Sanitary Laterals
6. Bedding and cover materials

B. Related Sections:

Section 03 20 00:	Reinforcing Steel
Section 03 30 00:	Cast-In-Place Concrete
Section 31 23 17:	Trenching, Backfilling, and Compacting

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO T180:	Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
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B. American Society for Testing and Materials-International (ASTM):

ASTM A74:	Standard Specification for Cast Iron Soil Pipe and Fittings.
ASTM A123/A123M:	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
ASTM C14:	Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
ASTM C76:	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
ASTM C443:	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
ASTM C564:	Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
ASTM D698:	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³)).
ASTM C923:	Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
ASTM D1557:	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³)).
ASTM D1785:	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

ASTM D2235:	Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
ASTM D2321:	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
ASTM D2466:	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
ASTM D2564:	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
ASTM D2729:	Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
ASTM D2751:	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
ASTM D2855:	Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
ASTM D2922:	Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM D3017:	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
ASTM D3034:	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
ASTM F477:	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. American Water Works Association (AWWA):

AWWA C104:	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
AWWA C105:	American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
AWWA C110:	American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
AWWA C111:	American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
AWWA C150:	ANSI Standard for the Thickness Design of Ductile Iron Pipe.
AWWA C151:	American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
AWWA C153:	American National Standard for Ductile-Iron Compact Fittings for Water Service.

D. National Fire Protection Association (NFPA):

NFPA 24:	Installation of Private Fire Service Mains and Their Appurtenances.
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1.03 SUBMITTALS

A. Section 01 33 00: Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate layout of sewer system and appurtenances. Show size, materials, components of system, and burial depth.

C. Product Data: Submit catalog cuts and other pertinent data indicating proposed materials, accessories, details, and construction information.

D. Submit reports indicating field tests made and results obtained.

E. Manufacturer's Installation Instructions:

1. Indicate special procedures required to install products specified.
2. Submit detailed description of procedures for connecting new sewer to existing sewer line and directional drilling installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

A. Section 01 70 00: Execution and Closeout Requirements: Requirements for submittals

B. Project Record Documents: Record location of pipe runs, connections, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

Perform Work in accordance with the County's Public Works' standards.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 3 years documented experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.07 PRE-INSTALLATION MEETINGS

A. Section 01 30 00: Administrative Requirements: Pre-installation meeting

B. Convene minimum 1 week prior to commencing work of this section.

C. Include affected utility companies and appropriate County officials.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00: Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Deliver and store valves in shipping containers with labeling in place.

C. Block individual and stockpiled pipe lengths to prevent moving.

1.09 FIELD MEASUREMENTS

Verify field measurements and elevations are as indicated on Drawings.

1.10 COORDINATION

A. Section 01 30 00: Administrative Requirements: Requirements for coordination

B. Notify affected utility companies minimum of 72 hours prior to construction.

PART 2. PRODUCTS

2.01 SANITARY SEWER PIPE AND FITTINGS

A. Ductile Iron Pipe: AWWA C150 or AWWA C151, 200 minimum pressure class, bell and spigot ends:

1. Outside Coating: AWWA C151, asphaltic coating, 1 mil uniform thickness
2. Lining: Cement mortar lined in accordance with AWWA C104
3. Polyethylene encasement: AWWA C105
4. Fittings: AWWA C153 or AWWA C110, ductile iron, Class 50 or above cement mortar lined in accordance with AWWA C104
5. Coat pipe and fittings exposed inside of structures with 2 coats of bituminous paint to achieve minimum dry film thickness of 2 mils per coat
6. Mechanical Joints: AWWA C111, rubber gasket joint devices

B. Plastic Pipe: ASTM D3034, SDR 35, polyvinyl chloride (PVC) material; bell and spigot style rubber ring sealed gasket joint:

1. Fittings: PVC
2. Joints: ASTM F477, elastomeric gaskets

2.02 FLEXIBLE COUPLINGS

Flexible Coupling: Resilient chemical-resistant elastomeric PVC coupling, 2 Series 300 stainless steel clamps, and stainless steel screws and housings.

2.03 FLEXIBLE PIPE BOOT FOR MANHOLE PIPE ENTRANCES

Flexible boot shall be Kor-n-Seal, or equal.

2.04 PIPE SUPPORTS

Metal for pipe support brackets: Structural steel galvanized thoroughly coated with bituminous paint.

2.05 CONCRETE ENCASEMENT AND CRADLES

A. Concrete: Conforming to "Section 03 30 00: Cast-in-Place Concrete," 4,000-psi 28-day reinforced concrete, rough-troweled finish.

B. Concrete Reinforcement: Conform to "Section 03 20 00: Reinforcing Steel."

2.06 UNDERGROUND PIPE MARKERS

A. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 2 inches wide by 4 mil thick, manufactured for direct burial service, printed with the words, "CAUTION SEWER LINE BURIED BELOW"

B. Trace Wire: Magnetic detectable conductor, 10 AWG, copper clad steel (CCS), insulated with HDPE or HMWPE

2.07 BEDDING AND COVER MATERIALS

- A. Conform with "Section 31 00 00: Earthwork" and "Section 31 23 17: Trenching, Backfilling, and Compacting."
- B. Bedding: Aggregate base
- C. Cover: Aggregate base

2.08 FINISHING: STEEL

Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication

PART 3. EXECUTION

3.01 EXAMINATION

- A. Section 01 30 00: Administrative Requirements: Verification of existing conditions before starting work
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on the Drawings.

3.02 PREPARATION

- A. Correct over-excavation with coarse aggregate.
- B. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities, and appurtenances.
- D. Maintain profiles of utilities. Coordinate with other utilities to eliminate interference. Notify Engineer where crossing conflicts occur.

3.03 BEDDING

- A. Excavate pipe trench in accordance with "Section 31 23 17: Trenching, Backfilling, and Compacting."
- B. Excavate to lines and grades shown on Drawings or required to accommodate installation of encasement.
- C. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- D. Provide sheeting and shoring in accordance with "Section 31 50 00: Excavation Support and Protection."

3.04 INSTALLATION: PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- B. Lay pipe to slope gradients noted on Drawings; with maximum variation from indicated slope of $\frac{1}{8}$ inch in 10 feet. Begin at downstream end and progress upstream.

- C. Assemble and handle pipe in accordance with manufacturer's instructions, except as modified on the Drawings or by Engineer.
- D. Keep pipe and fittings clean until work is completed and accepted by Engineer. Cap open ends during periods of work stoppage.
- E. Lay bell and spigot pipe with bells upstream.
- F. Polyethylene pipe encasement shall be AWWA C105.
- G. Connect pipe to existing sewer system at existing manhole.
- H. Install plastic ribbon tape continuous over top of pipe, buried **6 inches** below finish grade, above pipeline; coordinate with "Section 31 23 17: Trenching, Backfilling, and Compacting."
- I. Install trace wire continuous over top of pipe.

3.05 INSTALLATION: CONNECTION TO EXISTING MANHOLE

- A. Core drill existing manhole to clean opening. Using pneumatic hammers, chipping guns, and sledge hammers, is not permitted.
- B. Install watertight neoprene gasket and seal with non-shrink concrete grout.
- C. Concrete encase new sewer pipe minimum of **24 inches** to nearest pipe joint. Use epoxy binder between new and existing concrete.
- D. Prevent construction debris from entering existing sewer line when making connection.

3.06 INSTALLATION: WYE BRANCHES AND TEES

- A. Install wye branches or pipe tees at locations indicated on Drawings concurrent with pipe laying operations. Use standard fittings of same material and joint type as sewer main.
- B. Maintain minimum **5 feet** separation distance between wye connection and manhole.
- C. Use saddle wye or tee with stainless steel clamps for taps into existing piping. Mount saddles with solvent cement or gasket and secure with metal bands. Layout holes with template and cut holes with mechanical cutter.

3.07 INSTALLATION: SANITARY LATERALS

- A. Construct laterals from wye branch to terminal point 2 feet into public utility easement (PUE), as indicated on Drawings.
- B. Where depth of main pipeline warrants, construct riser type laterals from wye branch.
- C. Maintain **2 feet** minimum depth of cover over pipe.
- D. Maintain minimum **5 feet** separation distance between water and sewer laterals.
- E. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral. Install temporary marker stake extending from end of lateral to **12 inches** above finished grade. Paint top **6 inches** of stake with fluorescent orange paint.

3.08 BACKFILLING

- A. Backfill around sides and to top of pipe with cover fill in minimum lifts of **8 inches**, tamp in place, and compact to 90%. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
- B. Maintain optimum moisture content of bedding material to attain required compaction density.

3.09 FIELD QUALITY CONTROL

- A. Section 01 40 00: Quality Requirements: Field inspecting, testing, adjusting, and balancing
- B. Request inspection prior to and immediately after placing bedding.
- C. Compaction Testing: In accordance with Caltrans Tests 216 and 231
- D. When tests indicate work does not meet specified requirements, remove work, replace and retest.

3.10 PROTECTION OF FINISHED WORK

- A. Section 01 70 00: Execution and Closeout Requirements: Requirements for protecting finished work
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 41 13 - PUBLIC STORM UTILITY DRAINAGE PIPING

PART 1. GENERAL

1.01 SUMMARY

A. Section Includes:

1. Storm drainage piping
2. Accessories: fabric and grout
3. Underground pipe markers
4. Drainage inlets
5. Storm drain manholes
6. Street culverts
7. Bedding and cover materials
8. Concrete encasement and cradles

B. Related Sections:

Section 03 20 00:	Reinforcing Steel
Section 03 30 00:	Cast-In-Place Concrete
Section 31 00 00:	Earthwork
Section 31 50 00:	Excavation Support and Protection
Section 31 23 17:	Trenching, Backfilling, and Compacting

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO T180:	Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO M36/M36M:	Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
AASHTO M86:	Concrete, Sewer, Storm Drain, and Culvert Pipe
AASHTO M86M:	Concrete Sewer, Storm Drain and Culvert Pipe (Metric)
AASHTO M170:	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
AASHTO M170M:	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
AASHTO M196/M196M:	Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M198:	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M206:	Reinforced Concrete Arch Culvert Storm Drain, and Sewer Pipe
AASHTO M206M:	Reinforced Concrete Arch Culvert Storm Drain, and Sewer Pipe(Metric)
AASHTO M207:	Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
AASHTO M207M:	Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe(Metric)
AASHTO M252:	Corrugated Polyethylene Drainage Tubing
AASHTO M264:	Acrylonitrile-Butadiene-Styrene (ABS) and Poly Vinyl Chloride (PVC) Composite Sewer Piping
AASHTO M278:	Class PS 50 Polyvinyl Chloride (PVC) Pipe
AASHTO M288:	Geotextiles

AASHTO M294: Corrugated Polyethylene Pipe, 12- to 36-in Diameter

B. American Society for Testing and Materials-International (ASTM):

ASTM A123/A123M:	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A746:	Standard Specification for Ductile Iron Gravity Sewer Pipe
ASTM C14:	Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C14M:	Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C76:	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C76M:	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C443:	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C443M:	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
ASTM C969:	Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C969M:	Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)
ASTM C924:	Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
ASTM D698:	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ [600 kN-m/m ³])
ASTM D1557:	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ [2,700 kN-m/m ³])
ASTM D2235:	Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
ASTM D2321:	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D2564:	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D2729:	Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D2751:	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D2855:	Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D2922:	Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D3017:	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D3034:	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3350:	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM F405:	Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings

ASTM F477:	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F667:	Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings

1.03 SUBMITTALS

- A. Section 01 33 00: Submittal Procedures: Requirements for submittals
- B. Product Data: Submit data indicating pipe, pipe accessories, and joining materials.
- C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Section 01 70 00: Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents:
 - 1. Accurately record actual locations of pipe runs, connections, inlets, catch basins, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 3 years documented experience
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience

1.06 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00: Administrative Requirements: Pre-installation meeting
- B. Convene minimum 1 week prior to commencing work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00: Product Requirements: Requirements for transporting, handling, storing, and protecting products
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- D. Do not place pipe flat on ground. Cradle to prevent point stress.
- E. Store UV-sensitive materials out of direct sunlight.

1.08 COORDINATION

- A. Section 01 30 00: Administrative Requirements: Requirements for coordination
- B. Coordinate the Work with termination of storm sewer, trenching, connection to public storm sewer and connections to existing facilities.
- C. Coordinate unrecorded or variations in site conditions, and corresponding adjustments to construction requirements.

PART 2. PRODUCTS

2.01 GENERAL

- A. All materials shall be from new stock, delivered in new condition. Where no method of tests for materials is specified, the latest applicable test specified by ASTM shall be followed. Material specifications listed on the Drawings, where applicable, shall supersede those listed in the section.

2.02 STORM DRAINAGE PIPING

- A. Pipe with diameters of 4 inches through 10 inches shall meet AASHTO M252.
- B. Pipe with diameters of 12 inches through 60 inches shall meet AASHTO M294 or ASTM F2648.
- C. Corrugated HDPE drainage pipe, smooth interior with a Manning's n-value of 0.012 or less, inside nominal diameter as shown on Drawings. HDPE pipe shall be ADS N-12 WT, or approved equal.
 - 1. Fittings: ADS N-12 WT
 - 2. Joints: Integral bell meeting ASTM D3212 with a rubber gasket to form a watertight connection

2.03 BELL-BELL COUPLERS

- A. Bell-bell couplers shall be used to join plain ends of storm drain piping for a watertight connection, and shall be manufactured by ADS.

2.04 BAND COUPLERS

- A. All storm drain band couplers used to join fittings to each other or to HDPE pipe shall be premium-type band couplers approved for use by the pipe and fitting manufacturers, with integrated elastomeric gaskets. Note that band couplers shall not be used to join sections of new pipe, and shall only be used with prior approval from Engineer.

2.05 FITTINGS

- A. All storm drain fittings shall be manufactured of HDPE, ASTM D3350 cell classification 324420C, and shall be factory-manufactured conforming to ASTM F2648.

2.06 SLOPE ANCHOR ASSEMBLIES

- A. Slope anchor assemblies (used for anchoring non-buried HDPE pipe as shown on the Drawings) shall conform to Caltrans Standard Specification Section 69 and the details shown on the Drawings. Circular steel bands shall be modified to fit HDPE pipe corrugations. Unless specifically shown on the Drawings, cables and cable clamps will not be required on this project.

2.07 ACCESSORIES

- A. Geotextile Filter Fabric: AASHTO M288 for Subsurface Drainage Class B Non-biodegradable, non-woven; manufactured by Propex, brand name Geotex 601
- B. Grout: Specified in Section 03 60 00: Grout

2.08 UNDERGROUND PIPE MARKERS

- A. Plastic ribbon tape shall be bright colored, continuously printed, minimum 2 inches wide by 4 mil thick, manufactured for direct burial service, printed with the words "CAUTION STORM DRAIN PIPELINE BELOW."
- B. Trace wire shall be magnetic detectable conductor, 10 AWG copper clad steel (CCS), insulated with HDPE or HMWPE; fasteners shall be Copperhead Snakebite, or approved equal.

2.09 DRAINAGE INLETS

- A. Refer to "Section 03 30 00: Cast-in-Place Concrete" for specific concrete mix requirements for all concrete and grout materials used for drainage inlet construction.
- B. Drainage inlet shall be manufactured to the lines and grades shown on the Plans by Hilfiker Pipe Company, Eureka, California; or approved equal.
- C. Inlet grates shall be as shown on the Plans. Frames shall be rectangular frames as shown on the Plans. All grates and frames shall be hot-dip galvanized after fabrication in accordance with ASTM A-123 and shall have a zinc coating with a minimum thickness of 3.4 mil, equivalent to 2.0 oz. per square foot of grate surface.
- D. Steps shall be made from 1/2-inch Grade 60 steel and shall be shaped as shown on the Plans. Steps shall be OSHA-approved and shall be coated with polypropylene plastic or an equal coating capable of resisting corrosion by sulfuric acid. Rubber gasket waterstops shall be installed on all smooth-walled storm drain pipes where they penetrate the drainage inlet wall as shown on the Plans.

2.10 BEDDING AND COVER MATERIALS

- A. Bedding: Aggregate base as specified in "Section 31 00 00: Earthwork"
- B. Cover: Aggregate base as specified in "Section 31 00 00: Earthwork" as required for finished surface as shown Drawings
- C. Soil Backfill from top of pipe to top of trench: Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter

2.11 PIPE SUPPORTS AND ANCHORING

- A. Metal for pipe support brackets: Galvanized structural steel thoroughly coated with bituminous paint
- B. Metal tie rods and clamps or lugs: Galvanized steel sized in accordance with NFPA 24 thoroughly coated with bituminous paint

2.12 FINISHING - STEEL

- A. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication

B. Galvanizing for Nuts, Bolts and Washers: ASTM A153/A153M

PART 3. EXECUTION

3.01 EXAMINATION

A. Section 01 30 00: Administrative Requirements: Verification of existing conditions before starting work

B. Verify trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings. Notify the Engineer of discrepancies.

3.02 STORAGE OF MATERIALS

PIPE, FITTINGS, AND OTHER RELATED MATERIALS SHALL BE STORED IN A SAFE LOCATION OUT OF THE TRAVELED WAY.

3.03 TRENCH DEWATERING

A. Dewatering of excavations for trenches, or drainage inlets may be required to keep groundwater out of the excavation. Water will not be allowed in excavations during bedding, concrete pours, or backfill and compaction. If excessive groundwater is present and cannot be adequately controlled, the Engineer may deem the bottom of the trench unsuitable for placement of bedding material and require that the subgrade material be removed and replaced in accordance to "Section 31 23 17: Trenching, Backfilling, and Compacting."

3.04 STORM DRAIN PIPE INSTALLATION

A. Plastic pipe shall be installed in conformance with the manufacturer's recommendations and the trench details shown on the Plans. All pipe shall be centered in the trench.

B. All pipe shall be carefully lowered into the trench to prevent damage. Under no circumstances shall pipe be dropped, rolled, or dumped into trenches.

C. Pipe ends shall be carefully cleaned before the pipe is joined. Whenever work ceases for any reason, the end of the pipe shall be closed with a watertight fitting, plug, or cover. The interior of the pipe shall be kept free of dirt and debris as the work progresses.

D. All pipe field cuts shall be made in accordance with the manufacturer's recommendations and at right angles to the axis of the pipe, except where pipes terminate in manholes or at a skewed angle in a drainage inlet.

E. All joints shall be made in accordance with the manufacturer's recommendations. Pipe lubricant shall be applied to all pipe gaskets prior to joint assembly. Lubricant shall be of a type specifically made for the type of pipe being jointed. The Contractor shall provide all tools, equipment, and devices, such as special jacks, chains, chokers, and similar items, to make all joint connections.

3.05 BEDDING AND BACKFILL

A. Pipe shall be laid on an unyielding bed true to line and grade with compacted bedding material under the full length of the pipe. Bedding material shall be placed into the trench PRIOR to pipe placement, shall be compacted to a minimum of 90% relative compaction, and shall be of the thickness specified on the trench detail on the Plans. Bedding material under the coupling bells shall be hand-excavated to provide a minimum clearance under the bell of 1 inch.

- B. Backfill material in the pipe haunching zone between the bottom of the pipe and the springline of the pipe shall be hand-tamped with J bars or a pneumatic "pogo" stick to a relative compaction of 90% along the entire length of the pipe. Tamping with a shovel is not sufficient and does not meet this requirement.
- C. Backfill material from the springline of the pipe to the bottom of the trench patch shall be of the material, thickness, and compaction shown in the trench detail on the Plans and as specified in "Section 31 23 17: Trenching, Backfilling, and Compacting."

3.06 SLOPE ANCHOR ASSEMBLIES

- A. Where storm drain pipe is installed exposed on the ground surface, anchor assemblies conforming to the details on the Plans shall be installed on the pipe at locations 2 feet downstream from each pipe joint. Unless specifically shown on the Plans, cables and cable clamps will not be required on this project. Steel anchor pipes shall be driven full-depth. If necessary, the Contractor shall drill pilot holes to allow for full depth embedment of the anchor pipes.

3.07 DRAINAGE INLETS

- A. Drainage inlets shall conform to the details shown on the Plans. All drainage inlets shall be cast-in-place unless otherwise approved by the Engineer.
- B. Type GO, G1, and related drainage inlets shall have the top and "window" of the inlet poured monolithically with surrounding curb and sidewalk. Inlet windows shall be constructed with the top edge of the opening parallel to the top of the curb.
- C. Pipes connecting to new drainage inlets shall terminate flush with the inside face of the structure wall. If pipes are not installed monolithically with the inlet walls, they shall be neatly and smoothly grouted into the wall to the satisfaction of the Engineer. All voids between the pipe and the structure wall shall be filled with grout.
- D. Rubber gasket waterstops shall be installed on all smooth-walled storm drain pipes where they penetrate the drainage inlet wall as shown on the Plans.
- E. Where possible, drainage inlet steps shall be installed on a short-dimension wall without an opening.
- F. Drainage inlet excavations shall be backfilled as shown on the Plans and as specified in "Section 31 00 00: Earthwork" or "Section 31 23 17: Trenching, Backfilling, and Compacting."

3.08 STORM DRAIN ACCEPTANCE

- A. When new storm drain mains and manholes can be isolated from the storm drain system without causing backups, they shall be tested for acceptance by the Contractor under the direction of the Engineer. The Contractor shall furnish all materials, labor, and water needed for acceptance testing.

3.09 ENERGY DISSIPATER

- A. Where shown on the Drawings, the Contractor shall construct an energy dissipater in accordance with the details shown on the Drawings. All materials and construction shall be as specified in "Section 31 00 00: Earthwork."

END OF SECTION

SECTION 33 41 14 - STORM DRAINAGE STRUCTURES

PART 1. GENERAL

1.01 DESCRIPTION

- A. This section covers the work necessary for the construction of precast drainage inlets, catch basins, frames, grates, manhole and cleanouts for public storm utility drainage.
- B. Related Work
 - a. Section 31 50 00: Excavation Support and Protection
 - b. Section 33 41 13: Public Storm Utility Drainage Piping

1.02 SUBMITTALS

- A. Contractor shall submit manufacturer's certification that drainage inlet castings and grates meet specification requirements. Shop drawings shall be submitted to the Engineer for approval before furnishing castings and grates in conformance with "Section 01 33 00: Submittal Procedures."

PART 2. PRODUCTS

2.01 PRECAST CONCRETE DRAINAGE INLETS

- A. Precast concrete drainage inlets sections shall be as manufactured by the American Pipe and Construction Company, Hilfiker Pipe Company, or equal. The dimensions shall be as shown on the Plans and shall meet the requirements of ASTM Specifications C 913-96 and subsequent amendments.

2.02 DRAINAGE INLET GRATES

- A. Drainage inlet grates shall conform to dimensions shown on Plans and these Specifications. Grates shall conform to Caltrans Standard Plans, "2010 RSP D77B, Type 18-9X and 24-12X Grate" and Specifications. Grate type is shown on the Plans. Grates shall be constructed of 1/8-inch-thick by 1-inch flat bars welded at intersections, and the grate top shall fit flush with the top of concrete when seated in place. After fabrication, grates shall be hot-dipped galvanized. After installation, the grates shall not be loose fitting or wobbly or subject to noise or uplift.

2.03 MORTAR

- A. Standard premixed mortar conforming to ASTM C 387, Type S, or proportion 1 part Portland cement to 2 parts clean, well-graded sand which will pass a 1/8-inch screen, with water added only as necessary to produce a stiff workable mortar. Admixtures may be used not exceeding the following percentages by weight of cement.

1. Hydrated lime, 10%
 2. Diatomaceous earth or other inert materials, 5%
- B. Consistency of mortar shall be such that it will adhere to concrete and pipe surfaces. Mortar mixed for longer than 30 minutes shall not be used.

PART 3. EXECUTION

3.01 INSTALLATION

- A. Precast drainage inlets shall be installed in excavations on competent native soil or approved engineered fill that has been scarified and compacted to 90% relative compaction at the elevations shown on the Plans. Connection with storm drain piping shall be water tight.

END OF SECTION

APPENDIX A

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C = A x B)	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

FORM CWM-2: DEMOLITION WASTE IDENTIFICATION

MATERIAL DESCRIPTION	EST. QUANTITY	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

FORM CWM-4: DEMOLITION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-6: COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

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FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-8: DEMOLITION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

APPENDIX B



CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W. Wabash Ave. • Eureka, CA 95501-2138 • 707-441-8855 • FAX: 707-441-8877 • shninfo@shn-engr.com

Reference: 011034.040

July 24, 2014

Mr. Gregory P. Orsini, General Manager
McKinleyville Community Services District
PO Box 2037
McKinleyville, CA 95519

RECEIVED

JUL 28 2014

McK. C.S.D.

Subject: 2013 California Building Code Update, McKinleyville Activity Center Addition, McKinleyville, California

Mr. Orsini:

Previously, SHN Engineers & Geologists prepared the "Preliminary Geotechnical Report for a Proposed Addition to the McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California; APN 510-401-025," dated December 9, 2011. We understand that the project is now moving forward, but due to changes in the California Building Code since preparation of our initial geotechnical report, we are providing this update to bring the reporting into conformance with the current code.

The 2011 investigation identified the principal geologic hazard at the site to be strong to very strong seismic shaking produced by earthquakes generated on the Mad River fault zone. To our knowledge, the geologic hazards have not changed, and the mitigation approaches outlined in the 2011 report remain valid.

Table 1 Seismic Design Criteria Addition to the McKinleyville Activity Center	
S_s	2.698
S_1	1.089
F_a	1.0
F_v	1.50
S_{MS}	2.698
S_{M1}	1.633
S_{DS}	1.799
S_{D1}	1.089

The 2013 California Building Code requires the following information for seismic design. Based on the results of our field and laboratory testing, we classify the geologic subgrade at the project site as Site Class D (stiff soil profile), in accordance with Table 20.3-1 in American Society of Civil Engineers ASCE 7-10 (ASCE, 2013). Based on the Site Class, Occupancy Category (II) and a latitude and longitude of 40.9427° and -124.0982°, respectively, we obtained the "code based" design spectral response acceleration parameters using the United States Geological Survey "U.S. Seismic Design Maps tool," v. 3.1.0, updated July 11, 2013. Calculated values are presented in Table 1.

Mr. Gregory P. Orsini

2013 California Building Code Update, McKinleyville Activity Center Addition

July 24, 2014

Page 2

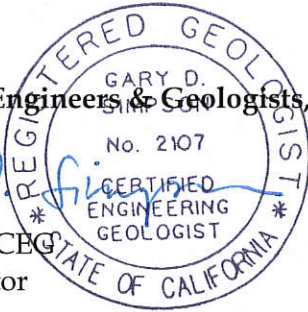
The general scope and approach for the addition to the existing McKinleyville Activity Center are generally the same as discussed in our 2011 report. The site conditions have not changed appreciably since our 2011 report, and in our opinion, the report is still current and applicable.

Respectfully,

SHN Consulting Engineers & Geologists, Inc.



Gary D. Simpson, CEG
Geosciences Director



GDS:dla

References

American Society of Civil Engineers. (October 1, 2013). "ASCE 7-10: Minimum Design Loads for Buildings and Other Structures, Third Printing (Includes Errata)." Reston, VA:ASCE.

California Building Standards Commission. (2013). *2013 California Building Code*. Based on International Building Code (2009) by the International Code Council. Sacramento, CA:California Building Standards Commission.

SHN Consulting Engineers & Geologists, Inc. (December 9, 2011). Preliminary Geotechnical Report for a Proposed Addition to the McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California; APN 510-401-025. Eureka:SHN.

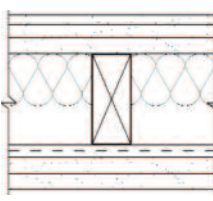
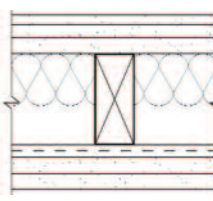
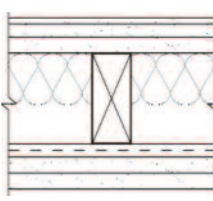
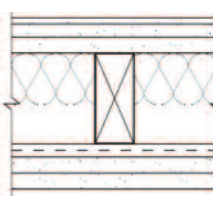
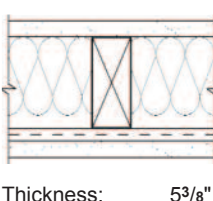
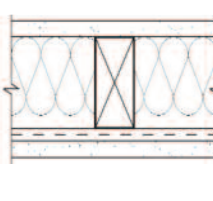
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JUL 28 2014

McK. C.S.D.

WALLS AND INTERIOR PARTITIONS, WOOD FRAMED

GA FILE NO. WP 3010	GENERIC	1 HOUR FIRE	60 to 64 STC SOUND
<p align="center">GYPSUM WALLBOARD, RESILIENT CHANNELS, GLASS FIBER INSULATION, WOOD STUDS</p> <p>Resilient channels 24" o.c. attached at right angles to ONE SIDE of 2 x 4 wood studs 16" o.c. with 1" Type S drywall screws. Base layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to channels with 1" Type S drywall screws 12" o.c. Face layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to channels with 3/4" daubs of adhesive 12" o.c. vertically and horizontally.</p> <p>OPPOSITE SIDE: Base layer 5/8" type X gypsum wallboard or gypsum veneer base applied parallel to studs with 5d coated nails, 15/8" long, 0.086" shank, 15/64" heads, 32" o.c. Second layer 1/2" type X gypsum wallboard or gypsum veneer base applied parallel to studs with 8d coated nails, 23/8" long, 0.113" shank, 9/32" heads, 12" o.c. Face layer 3/8" regular gypsum wallboard applied parallel to studs with 3/4" daubs of adhesive 12" o.c. vertically and horizontally. 2" glass fiber insulation, 0.90 pcf, stapled to three layer side in stud space.</p> <p>Joints staggered 16" each layer and side. (LOAD-BEARING)</p>			
<p>Thickness: 67/8" Approx. Weight: 12 psf Fire Test: UL R3660-2, 12-3-68, UL Design U313 Sound Test: RAL TL69-117, 12-16-68</p>			
GA FILE NO. WP 3110	GENERIC	1 HOUR FIRE	55 to 59 STC SOUND
<p align="center">GYPSUM WALLBOARD, RESILIENT CHANNELS, GLASS FIBER INSULATION, WOOD STUDS</p> <p>Resilient channels 24" o.c. attached at right angles to ONE SIDE of 2 x 4 wood studs 16" o.c. with 1" Type S drywall screws. Base layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to channels with 1" Type S drywall screws 12" o.c. Face layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to channels with 3/4" daubs of adhesive 12" o.c. vertically and horizontally.</p> <p>OPPOSITE SIDE: Base layer 5/8" type X gypsum wallboard or gypsum veneer base applied parallel to studs with 5d coated nails, 15/8" long, 0.086" shank, 15/64" heads, 32" o.c. Second layer 1/2" type X gypsum wallboard or gypsum veneer base applied parallel to studs with 8d coated nails, 23/8" long, 0.113" shank, 9/32" heads, 12" o.c. Face layer 1/4" regular gypsum wallboard applied parallel to studs with 3/4" daubs of adhesive 12" o.c. vertically and horizontally. 2" glass fiber insulation, 0.90 pcf, stapled to three layer side in stud space.</p> <p>Joints staggered 16" each layer and side. (LOAD-BEARING)</p>			
<p>Thickness: 63/4" Approx. Weight: 2 psf Fire Test: UL R3660-2, 12-3-68, UL Design U313 Sound Test: RAL TL69-286, 6-20-68 (Rev. 9-4-68)</p>			
GA FILE NO. WP 3240	PROPRIETARY*	1 HOUR FIRE	50 to 54 FSTC SOUND
<p align="center">GYPSUM WALLBOARD, RESILIENT CHANNELS, MINERAL FIBER INSULATION, WOOD STUDS</p> <p>Resilient channels 24" o.c. attached at right angles to ONE SIDE of 2 x 4 wood studs 16" or 24" o.c. with 1 1/4" Type S drywall screws. One layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied parallel to channels with 1" Type S drywall screws 12" o.c. End joints backblocked with resilient channels. 3" mineral fiber insulation, 2.0 or 2.3 pcf, in stud space.</p> <p>OPPOSITE SIDE: One layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to studs with 1 1/4" Type W drywall screws 12" o.c.</p> <p>Vertical joints staggered 48" on opposite sides. Sound tested with studs 16" o.c. and open face of mineral fiber insulation blankets toward resilient channel-side of stud space. (LOAD-BEARING)</p> <p align="center">PROPRIETARY GYPSUM BOARD</p> <p>United States Gypsum Company - 5/8" SHEETROCK® Brand FIRECODE® C Core Gypsum Panels</p>			
<p>Thickness: 53/8" Approx. Weight: 7 psf Fire Test: UL R1319-93, 94, 129; 8-10-66; UL Design U311; ULC Design U311 Field Sound Test: BBN 760903, 9-17-76</p>			

**Contact the manufacturer for more detailed information on proprietary products.*



CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W. Wabash • Eureka, CA 95501-2138 • 707-441-8855 • FAX: 707-441-8877 • shninfo@shn-engr.com

Reference: 011034.040

September 18, 2014

Mr. Gregory P. Orsini, General Manager
McKinleyville Community Services District
P.O. Box 2037
McKinleyville, CA 95519

Subject: Foundation Plan Review, Teen Center Addition to the McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California

Dear Mr. Orsini:

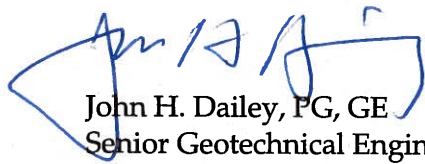
As requested, SHN Consulting Engineers & Geologists, Inc. (SHN) has completed our review of the foundation plans prepared by LDA Partners, LLP, with structural engineering by J.H. Lawder, Inc. (Sheets S2.1 and S5.1), dated September 18, 2014, for the Teen Center Addition to the McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California. SHN previously performed a geotechnical investigation for the project, and presented the results in our report dated December 9, 2011.

Based on our review, we believe that the foundation plans appear to be in substantial conformance with the recommendations presented in our geotechnical investigation report, provided the site preparation and grading recommendations presented in our geotechnical investigation report are followed. SHN should be retained to provide inspections during site grading and installation of foundations to check conformance of the work with project guidelines.

We trust this provides the information you require at this time. If you have any questions, please call me at 707-459-4518. Thank you for the opportunity to be of service to you on this project.

Sincerely,

SHN Consulting Engineers & Geologists, Inc.


John H. Dailey, PG, GE
Senior Geotechnical Engineer



JHD:amg



Reference: 011034.040

December 9, 2011

Mr. Norman Shopay
General Manager
McKinleyville Community Services District
P.O. Box 2037
McKinleyville, CA 95519

**Subject: Preliminary Geotechnical Report for a Proposed Addition to the
McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California;
APN 510-401-025**

Dear Mr. Shopay:

This report documents the results of the geotechnical investigation conducted in November 2011 by SHN Consulting Engineers & Geologists, Inc. (SHN). This letter report is intended to provide findings, conclusions, and recommendations related to general geotechnical aspects of project design and construction. This report is also intended to satisfy the requirements of the Humboldt County Building Department for the proposed project.

1.0 Site Location

Address: 1685 Gwin Rd., McKinleyville, California
Assessor's Parcel Number: 510-401-025
Latitude and Longitude: 40.9427, -124.0982
The project location is shown on Figure 1.

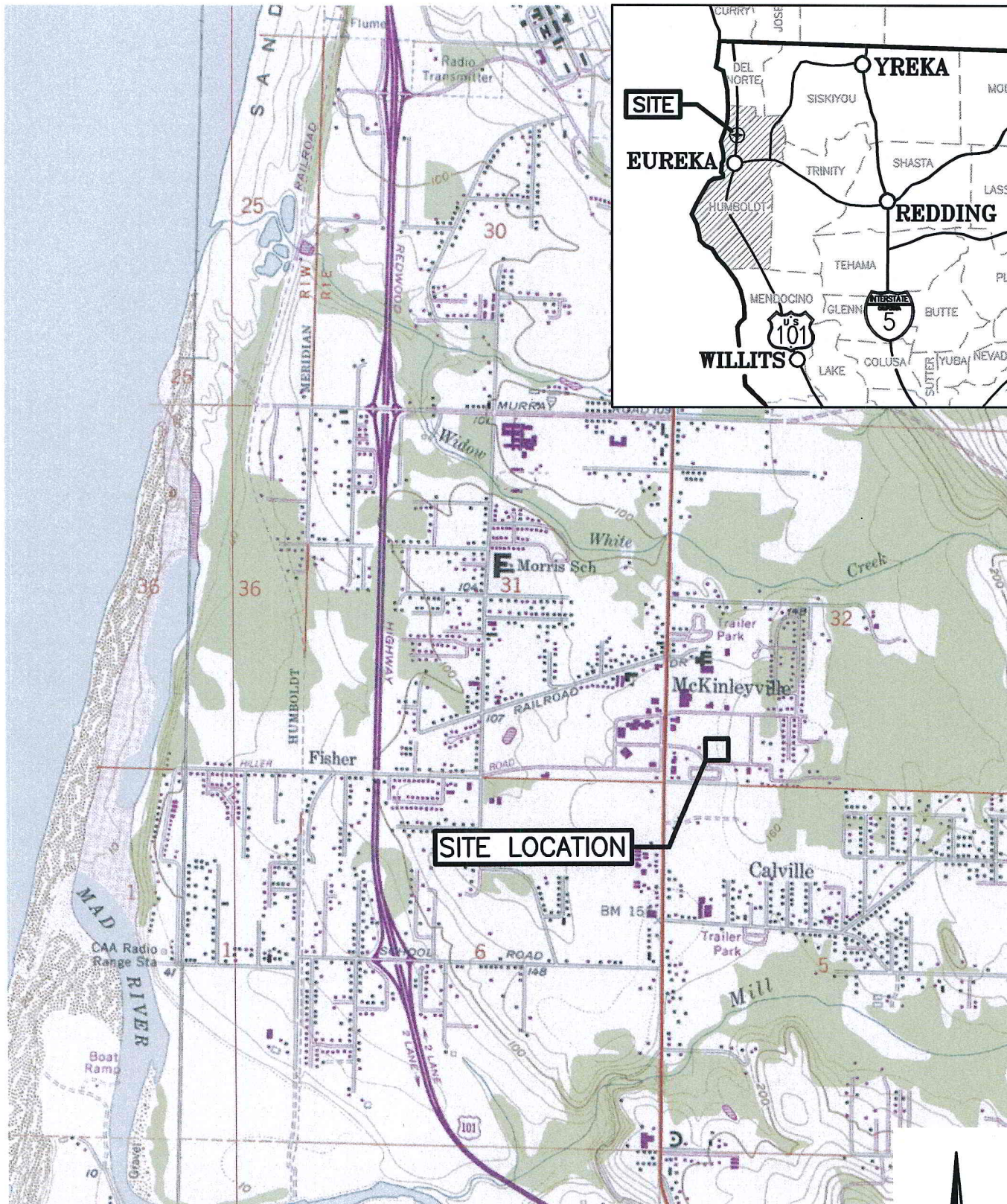
2.0 Project Description

We understand that the project consists of a one-story, approximately 6,790-square foot (97 feet by 70 feet) addition to the existing McKinleyville Activity Center. The proposed location of the addition is on the west side of the existing building and is expected to be contiguous with the existing structure as shown on the site plan, Figure 2. Foundation plans were not developed at the time of this writing and a design team has not been formed. The existing structure is a metal building with loads transferred onto a perimeter footing. Design details, especially depth and width of footings for the existing structure are unknown. We expect that the foundation system for the structure will consist of a concrete slab-on-grade and continuous perimeter footing.

3.0 Field Investigation and Laboratory Testing

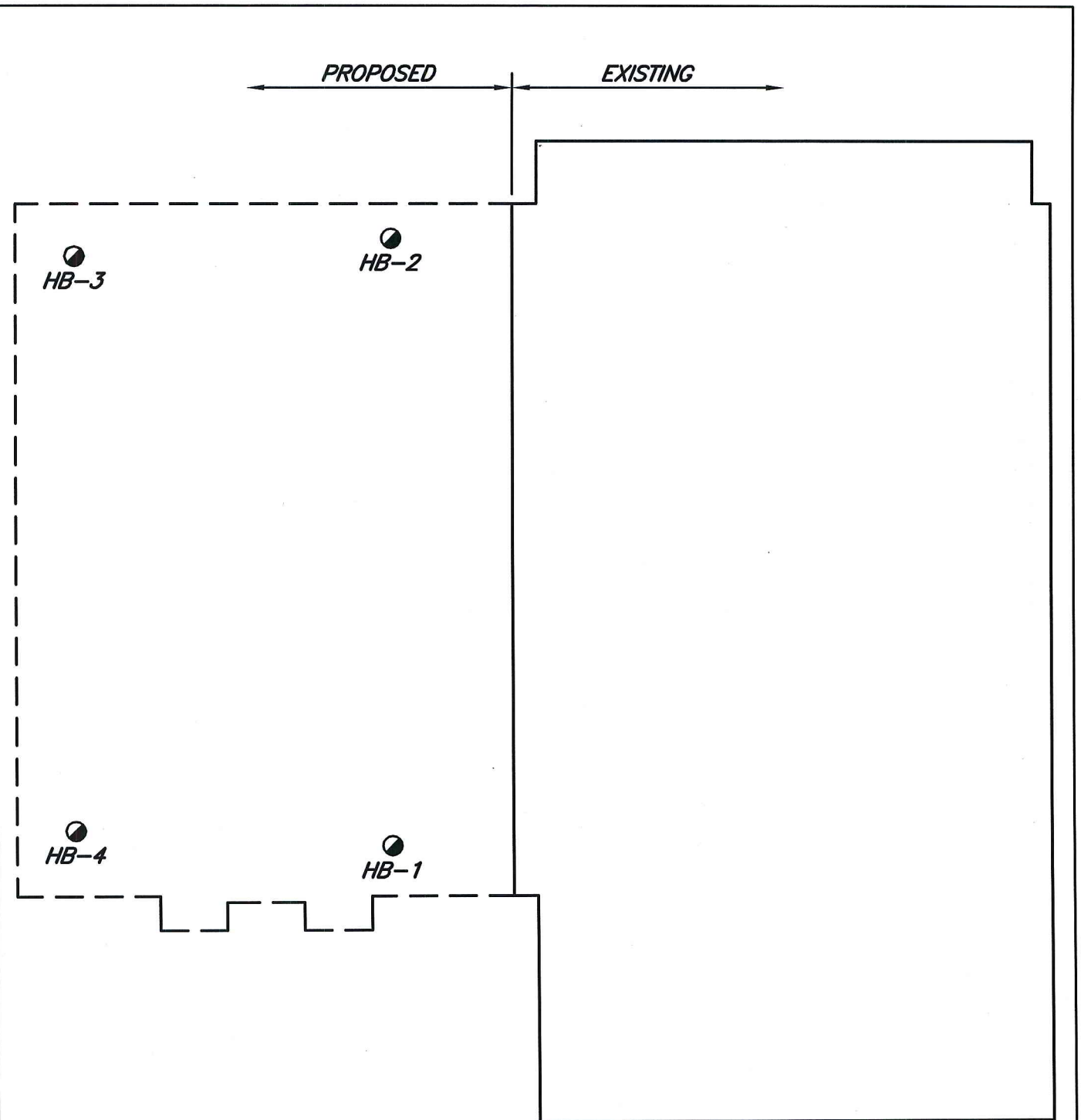
On November 10, 2011, a geologist from SHN evaluated the proposed building site. Four hand-augered borings (HB-1 through HB-4, see Figure 2) were advanced to depths ranging from 4.0 to 6.25 feet below the ground surface (BGS). Soils were logged in general accordance with the Unified Soil Classification System (USCS). Undisturbed samples were collected and laboratory moisture-density tests were conducted. Descriptions of the soil profiles and laboratory test results are presented on the attached field logs (Attachment 1).

\\Zing\projects\2011\011034-MCSD-MSA\Drawings - SAVED: 12/7/2011 1:47 PM NDOWNEY, PLOTTED: 12/9/2011 5:08 PM, NATHAN DOWNEY



SOURCE: ARCATA NORTH, TYEE CITY
USGS 7.5 MINUTE QUADRANGLES

\\zing\projects\2011\011034-MCSD-MSA\Drawings, SAVED: 12/7/2011 1:44 PM NDOWNNEY, PLOTTED: 12/9/2011 5:12 PM, NATHAN DOWNEY



EXPLANATION

● **HAND AUGER BORING
LOCATION AND DESIGNATION**

--- **OUTLINE OF PROPOSED
ADDITION**

SOURCE: BASE MAP PROVIDED BY
BONNIE OLIVER ARCHITECT

NOTE: ALL LOCATIONS APPROXIMATE

SH
Consulting Engineers
& Geologists, Inc.

McKinleyville Community Services District
Family Center Soils Report
McKinleyville, California

Site Plan
SHN 011034.040

November 2011

011034-040-SITE

Figure 2

4.0 Site Conditions

The project site is situated on a broad late-Pleistocene-age marine terrace that exists throughout much of the McKinleyville area. The location of the proposed addition, west of the existing structure is generally flat with a small, 1-to 2-foot drop in elevation from soil mounds that exists in the northern portion of the proposed footprint. The surface is grass with a sidewalk within 5 feet of the existing structure.

During our investigation, we encountered varying amounts of fill in HB-1, HB-2, and HB-4. Fill materials consisted of dark brown to dark yellowish brown silty sand with gravel. Depths of the fill ranged from 1.25 feet BGS (HB-1 and HB-2) to 1.5 feet BGS (HB-4).

In general, native soils were encountered at the ground surface in HB-3 and beneath the fill in HB-1, HB-2, and HB-4. Native soil consists of dark brown sandy silt/silty sand (SM/ML) organic topsoil overlying medium dense to dense yellowish brown silty sand (SM) to the maximum depths explored. The dark brown color is attributed to a high concentration of organic material, which is typical of topsoil in the area. The topsoil extends to between 2.25 and 4.25 feet BGS. Descriptions of soils encountered in our borings are presented on the Attachment 1.

Groundwater was not observed during our investigation. Water levels can be expected to fluctuate in response to seasons, storm events, and other factors, and may become higher or lower than indicated by the subsurface observations made.

From our site investigation and our understanding of site geology and soils conditions, we estimate the site can be categorized as a Site Class D (stiff soil profile) in the upper 100 feet, for determining seismic loads for structural design as outlined in the 2010 California Building Code (CBC).

5.0 Geologic Hazards

- The principal geologic hazard at the site is strong to very strong levels of seismic shaking produced by earthquakes generated on the Mad River fault zone, or other regional sources along the north coast. The closest state-designated active faults to the project site are the Mad River fault, about 4,000 feet to the southwest, and the McKinleyville fault, about 5,000 feet to the northeast,
- The project site is not located within an Alquist Priolo Fault Hazard Zone.
- The project site is located on a flat lying surface, and we conclude that it has a negligible risk of slope instability or creep.
- The project site is not within a 100-year flood zone.
- We conclude that risk of liquefaction and lateral spreading are negligible to low due to the Pleistocene age of any underlying sand layers that may exist.
- The tsunami risk is considered negligible.

6.0 Conclusions and Discussion

Based on the results of our field and laboratory investigations, it is our opinion that the project site can be developed as proposed. The addition should be designed and built in accordance with the

Mr. Norman Shopay

Geotechnical Report for a Proposed Addition to the McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California; APN 510-401-025

December 9, 2011

Page 3

2010 CBC and the preliminary recommendations within this report. We do not expect the structure to contribute or be subject to substantial geologic hazards throughout the economic life span of the project.

The primary geotechnical site considerations are undocumented fill that was encountered in three of our borings and underlying organic topsoil. The latter is susceptible to compression that could result in excessive total and differential settlement of the proposed foundation system. These soils are typical of soils encountered in the McKinleyville area. To our knowledge, the fill is undocumented and is, therefore, considered inadequate for uniform support of the concrete slab in its existing condition.

The upper topsoil typically is of relatively low density and tends to be compressible when subjected to foundation loads. The material is unsuitable for reuse as structural fill. Typical recommendations where these conditions are encountered in the past have included:

- extend footing excavations down through the darker colored topsoil, into competent light-colored native soil; and
- remove the unsuitable topsoil and replace it with structural fill or weak sand cement slurry to support conventional shallow foundations.

No high plasticity clayey soils were encountered, therefore the risk of adverse consequences to the structure from expansive soils is considered low.

7.0 Recommendations

7.1 Seismic Design Criteria

We recommend that the proposed structure be designed and built to withstand strong seismic shaking. The minimum standard for construction of the structure should be in accordance with the 2010 California Building Code for the most seismically active areas.

Based on the Site Class and the latitude and longitude, we calculated the design spectral response acceleration parameters S_s , S_1 , F_a , F_v , S_{MS} , S_{M1} , S_{DS} , and S_{D1} using the United States Geological Survey (USGS) seismic calculator program, "Seismic Hazard Curves, Response Parameters, Design Parameters: Seismic Hazard Curves, and Uniform Hazard Response Spectra," v. 5.1.0, dated February 10, 2011. The resulting design spectral response acceleration parameters are presented in Table 1.

Table 1	
Seismic Design Criteria	
Latitude	40.9427
Longitude	-124.0982
Site Class	D
S_s	2.690
S_1	1.051
F_a	1.0
F_v	1.50
S_{MS}	2.690
S_{M1}	1.576
S_{DS}	1.793
S_{D1}	1.051
Occupancy Category	II
Seismic Design Category	E

7.2 Site Preparation and Grading

In developing site grading recommendations, two options are envisioned:

1. Keep the site grade at about the existing grade, which will minimize importing fill. This will result in a finished floor slab lower than that of the existing building. However, the existing fill must be excavated and replaced as structural fill.
2. Raise the site grade to be equal to that of the existing building. This will result in excavating and compacting the existing fill and importing clean fill. This will also result in deeper foundations to the competent soils that were encountered below the organic topsoil.

There are utilities adjacent to the existing building that should be identified and relocated. As appropriate, notify Underground Service Alert (1-800-624-2444) prior to commencing site work, and use this location service and other methods to avoid injury or risk to life from underground and overhead utilities, and to avoid damaging them.

If site grades will not change appreciably (not including pavement or concrete slab and underlying base): Foundations are to be extended to the underlying non-organic native soil, regardless of site grade. To support the concrete slab, we recommend that existing fill be removed and replaced to a sufficient depth so that a relatively uniform 12 inches of compacted structural fill provides the support for the concrete slab-on-grade. There may be areas where additional fill is placed over existing fill to achieve site grade. Where that occurs, we recommend that the existing surface be proof-rolled to detect any soft areas and to induce compression of loose fill. The existing fill is suitable for reuse as structural fill; topsoil is not suitable.

If site grade is to be raised: This will extend the depth of foundations and the width of foundation excavations. The existing undocumented fill should be excavated and may be reused as structural fill prior to importing clean fill. Undocumented fill should be excavated for a distance of 5 feet beyond the proposed addition area, measured at the bottom of the excavation. This material may be reused as structural fill. A firm and unyielding surface should be established before additional structural fill is placed to raise site grade .

Structural fill may be required to raise the grades to support the floor slab. Structural fill material should consist of relatively non-plastic (Liquid Limit less than 40, Plasticity Index less than 14) material containing no organic material or debris, and no individual particles over 6 inches across. If gravel is used, it should be well graded, to include a variety of particle sizes to minimize relatively large void spaces, into which fine grained soils can migrate. We suggest the use of well-graded granular soils (sand, gravel) for fill, because these soils are relatively easy to moisture condition and compact.

Structural fill should be placed to design grades and compacted to a minimum of 90% of the maximum relative dry density as determined by the current American Society for Testing and Materials-International (ASTM) D1557 test method.

7.3 Foundations

Foundations should be sized, reinforced, and embedded at least to the minimum values in the 2010 California Building Code. However, because the existing topsoil is unsuitable for foundations support, one of the following options should be implemented:

1. Remove topsoil during site grading to expose the underlying yellow-brown native soil that is competent and removed from the site. Structural fill should be used to replace the unsuitable topsoil.
2. Leave topsoil in place and deepen foundations to extend at least 6 inches in the underlying yellow-brown native soil.
3. Leave topsoil in place and deepen foundation excavations to extend to the underlying yellow-brown native soil. The width of the excavation should be twice the width of the assumed perimeter footing. Backfill may consist of structural fill or a weak sand-cement slurry (2-sack mix) that is placed to raise the surface to the minimum foundation depth. Alternately, structural fill can be placed to subgrade elevation to allow foundation excavations to be cut neat into this material.

Foundations in native soil (not topsoil) may be designed so they do not exceed an allowable bearing capacity of 2,500 pounds per square foot (psf) for dead plus live loads. This value may be increased by one-third to account for the short-term effects of wind and/or seismic loading. Settlement estimates are provided under "Section 6.0: Conclusions and Discussion," above.

Any backfill soils placed alongside footings should be compacted to a minimum of 90% per the ASTM D 1557 test method.

A horizontal friction coefficient of 0.35 may be used for the footing-soil contact. Frictional resistance may be calculated in conjunction for short-term loadings (such as, lateral foundation resistance in response to wind or earthquake loadings). On the basis that structural fill will provide this temporary resistance, an allowable lateral passive pressure represented by an equivalent fluid weighing 300 pounds per cubic foot is appropriate.

The ground surface around the structure perimeter should be sloped away, or other design measures implemented to provide positive surface water drainage away from perimeter foundation areas.

We are not aware of design or construction details regarding the foundation system for the existing structure. Specifically, the depth of embedment of the perimeter footing and supporting soil (native competent soil, topsoil, structural fill) are not known. This determination should be made to assist the structural engineer in design if the new addition is to be tied into the existing structure.

7.4 Slabs-on-Grade

Concrete slabs-on-grade may be supported directly on at least 6 inches of crushed rock over structural fill that is placed in accordance with this report. If a moisture-sensitive floor covering is anticipated for the building, a vapor barrier should be used to minimize transmission of soil moisture and gas (methane, radon) up through floor slab. Typically, vapor barrier thickness

should be 10 to 15 mils. The vapor barrier shall be in accordance with ASTM E-1745, "Standard Specifications for Vapor Barrier Retarders used in Contact with Soil or Granular Fill under Concrete Slabs." The product should be installed in accordance with the manufacturer's recommendations. There are many manufacturers that provide this product including, but not limited to, Sto-Cote Products (TU-TUFF), Griffolyn Company (T-65), 10 to 14 mil Stego Wrap, or any polyethylene vapor reduction membrane at least 10 mils in thickness. The membrane should be overlapped at least 12 inches and taped at joints. Concrete typically is poured directly on the vapor barrier, which has the added benefit of allowing a shorter concrete bleeding time and preventing water from leaving the concrete and wetting the subgrade. It is a common practice to cover the membrane with a few inches of sand to protect the membrane during construction, especially if the membrane is thin (around 10 mil) and to aid in concrete curing. Whether or not a sand layer is placed above the membrane, the membrane should be protected from tearing or puncture during construction.

8.0 Closure and Limitations

The analyses, conclusions, and recommendations contained in this report are based on site conditions that we observed at the time of our investigation, data from our subsurface explorations and laboratory tests, our current understanding of proposed project elements, and on our experience with similar projects in similar geotechnical environments. We have assumed that the information obtained from our limited subsurface explorations is representative of subsurface conditions throughout the site.

If the scope of the proposed construction, including the proposed loads, grades, or structural locations, changes significantly from that described in this report, our recommendations should also be reviewed.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we should review our report to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse. This report is applicable only to the project and site studied.

The conclusions and recommendations presented in this report are professional opinions derived in accordance with current standards of professional practice. No representation, express or implied, of warranty or guarantee is included or intended. Our recommendations are tendered on the assumption that design of the improvements will conform to their intent.

The field work was conducted to investigate the site characteristics specifically addressed by this report. Assumptions about other site characteristics, such as hazardous materials contamination, or environmentally sensitive or culturally significant areas, should not be made from this report.

Mr. Norman Shopay

Geotechnical Report for a Proposed Addition to the McKinleyville Activity Center, 1685 Gwin Road, McKinleyville, California; APN 510-401-025

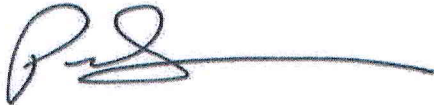
December 9, 2011

Page 7

This report concludes our work on the project in accordance with our current agreement. If you have any questions, please call either of us at 707-441-8855.

Sincerely,

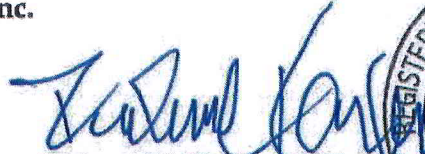
SHN Consulting Engineers & Geologists, Inc.



Paul R. Sundberg
Staff Geologist

PRS:RWH/JPB:lms

Attachment 1. Field Boring Logs



Richard W. Hanford, P.E., G.E.*
Senior Geotechnical Engineer



References Cited

ASTM E-1745, "Standard Specifications for Vapor Barrier Retarders used in Contact with Soil or Granular Fill under Concrete Slabs."

California Building Standards Commission. (2010). *2010 California Building Code-Title 24 Part 2, Two-Volumes*. Based on International Building Code (2009) by the International Code Council. Sacramento:California Building Standards Commission.

United States Geologic Survey. (February 10, 2011). "Seismic Hazard Curves, Response Parameters, Design Parameters: Seismic Hazard Curves, and Uniform Hazard Response Spectra," v. 5.1.0. NR:USGS.

---. (NR). Arcata North and Tyee City 7.5-Minute Quadrangles. NR:USGS.

Attachment 1

Field Boring Logs



CONSULTING ENGINEERS
& GEOLOGISTS

METHOD OF SOIL CLASSIFICATION

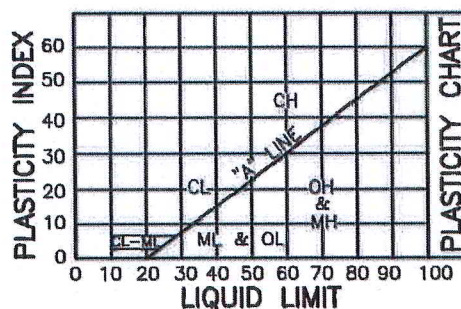
MAJOR DIVISIONS		SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN 1/2 OF SOIL >NO. 200 SIEVE SIZE)	<u>GRAVELS</u> (MORE THAN 1/2 OF COARSE FRACTION > NO.4 SIEVE SIZE)	GW	WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	<u>SANDS</u> (MORE THAN 1/2 OF COARSE FRACTION < NO.4 SIEVE SIZE)	SW	WELL GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SM	SILTY SANDS, SAND-SILT MIXTURES
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN 1/2 OF SOIL <NO. 200 SIEVE SIZE)	<u>SILTS & CLAYS</u> LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	<u>SILTS & CLAYS</u> LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS, ORGANIC SILTS
		HIGHLY ORGANIC SOILS	

CLASSIFICATION CHART

CLASSIFICATION CHART

CLASSIFICATION	U.S. STANDARD SIEVE SIZE
BOULDERS	ABOVE 12"
COBBLES	12" TO 3"
GRAVEL COARSE FINE	3" TO NO. 4 3" TO 3/4" 3/4" TO NO. 4
SAND COARSE MEDIUM FINE	NO. 4 TO NO. 200 NO. 4 TO NO. 10 NO. 10 TO NO. 40 NO. 40 TO NO. 200
SILT & CLAY	BELOW NO. 200

GRAIN SIZE CHART



CONSISTENCY OF FINE GRAINED SOILS		DENSITY OF COARSE GRAINED SOILS	
CLASSIFICATION	COHESION (PSF)	CLASSIFICATION	STANDARD PENETRATION (BLOW COUNT)
VERY SOFT	0-250	VERY LOOSE	0-4
SOFT	250-500	LOOSE	4-10
MEDIUM STIFF	500-1000	MEDIUM	10-30
STIFF	1000-2000	DENSE	30-50
VERY STIFF	2000-4000	VERY DENSE	50+
HARD	4000+		

MOISTURE CLASSIFICATIONS

DRY
DAMP
MOIST
WET

BASED ON UNIFIED
SOILS CLASSIFICATION
SYSTEM



BORING LOG KEY

SAMPLE TYPES



DISTURBED
SAMPLE
(BULK)



HAND
DRIVEN TUBE
SAMPLE



1.4" I.D.
STANDARD
PENETRATION
TEST SAMPLE
(SPT)



2.5" I.D.
MODIFIED
CALIFORNIA
SAMPLE
(SOLID WHERE RETAINED)



CORE
BARREL
SAMPLE
(NOT RETAINED)



CORE
BARREL
SAMPLE
(RETAINED)

SYMBOLS



INITIAL WATER LEVEL



STABILIZED WATER LEVEL



GRADATIONAL CONTACT



WELL DEFINED CONTACT

SS

SPLIT SPOON



Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Proposed Teen/Family Center

JOB NUMBER: 011034.040

LOCATION: SE Corner of Proposed Addition

DATE DRILLED: 11/10/2011

GROUND SURFACE ELEVATION: Approx 152 Feet MSL

TOTAL DEPTH OF BORING: 6.0 Feet

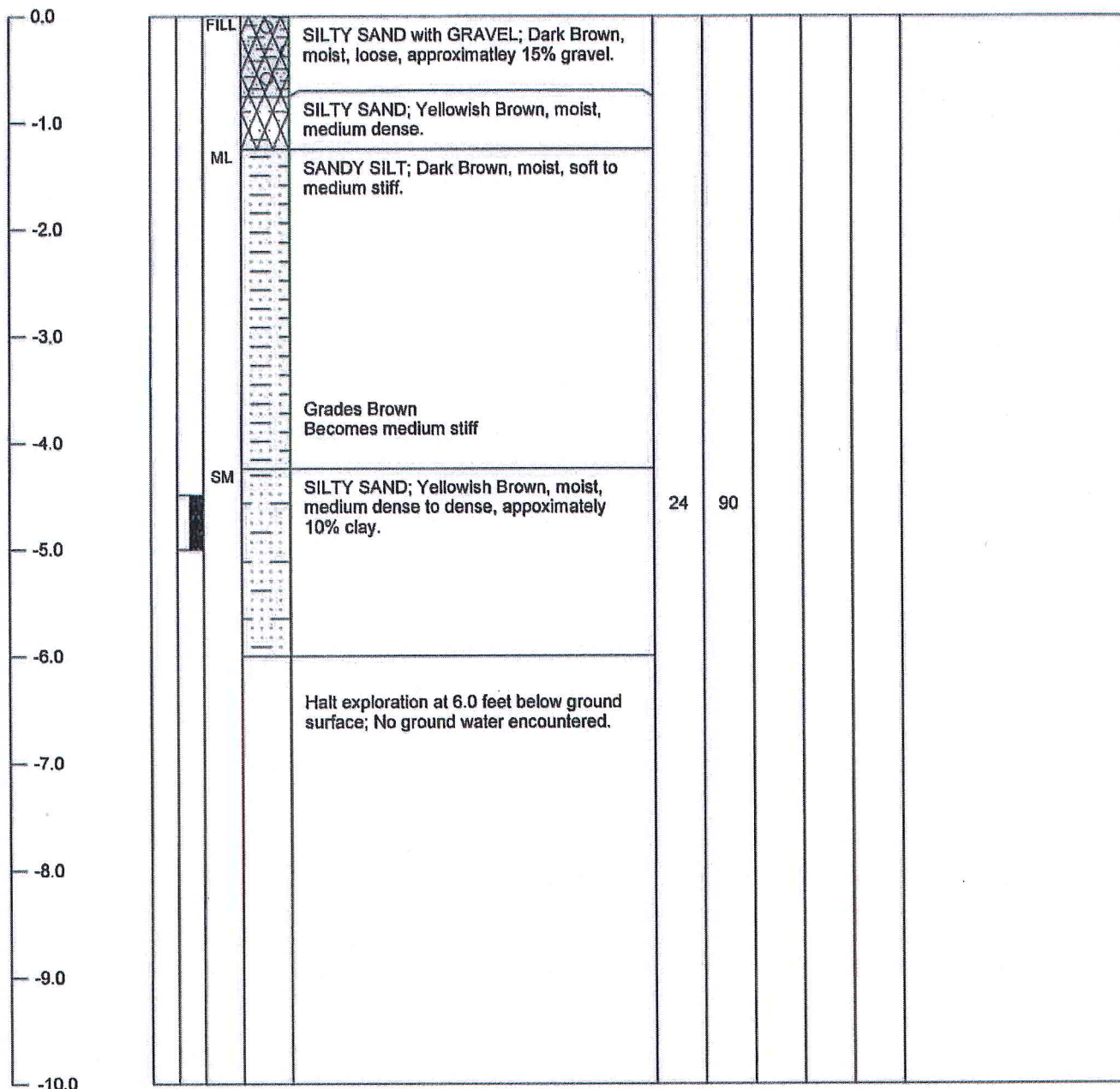
EXCAVATION METHOD: 3" Hand Auger

SAMPLER TYPE: 2.5-inch thin-walled tube

LOGGED BY: PRS

**BORING
NUMBER
HB-1**

DEPTH (FT)	BULK SAMPLES TUBE SAMPLE	USCS	PROFILE	SOIL DESCRIPTION (ASTM D 2488)	% Moisture	Dry Density (pcf)	Unc. Com. (pcf)	U.C. (pcf) by P.P.	% Passing 200	REMARKS
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The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD LOG

Page Number 1 of 1



Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Proposed Teen/Family Center

JOB NUMBER: 011034.040

LOCATION: NE Corner of Proposed Addition

DATE DRILLED: 11/10/2011

GROUND SURFACE ELEVATION: Approx 150 Feet MSL

TOTAL DEPTH OF BORING: 5.5 Feet

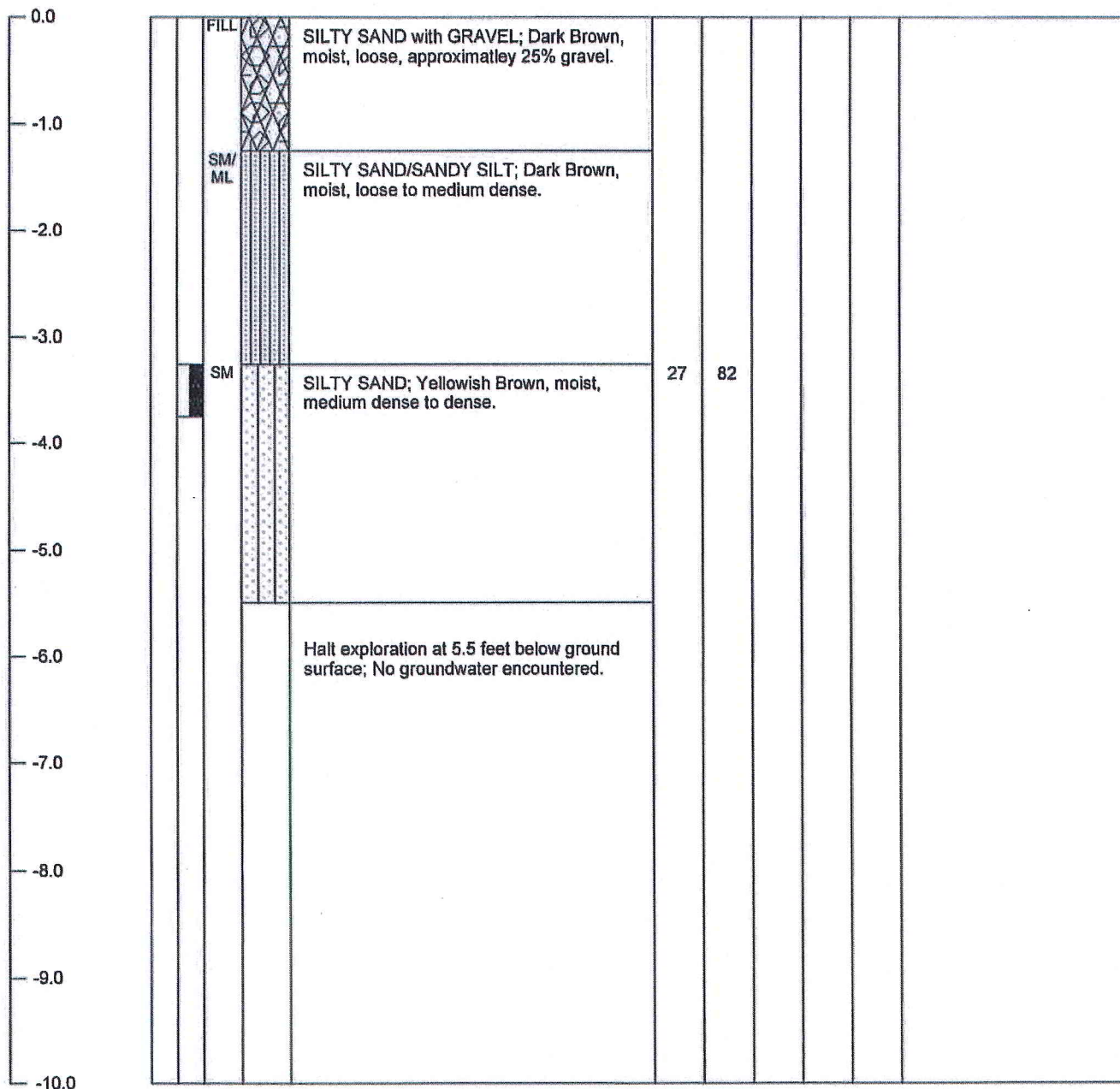
EXCAVATION METHOD: 3" Hand Auger

SAMPLER TYPE: 2.5-inch thin-walled tube

LOGGED BY: PRS

**BORING
NUMBER
HB-2**

DEPTH (FT)	BULK SAMPLES TUBE SAMPLE	USCS	PROFILE	SOIL DESCRIPTION (ASTM D 2488)	% Moisture	Dry Density (pcf)	Unc. Cor. (pcf)	U.C. (pcf) by P.P.	% Passing 200	REMARKS
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The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD LOG

Page Number 1 of 1



Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Proposed Teen/Family Center

JOB NUMBER: 011034.040

LOCATION: NW Corner of Proposed Addition

DATE DRILLED: 11/10/2011

GROUND SURFACE ELEVATION: Approx 150 Feet MSL

TOTAL DEPTH OF BORING: 4.0 Feet

EXCAVATION METHOD: 3" Hand Auger

SAMPLER TYPE: 2.5-inch thin-walled tube

LOGGED BY: PRS

**BORING
NUMBER
HB-3**

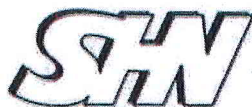
DEPTH (FT)	BULK SAMPLES TUBE SAMPLE	USCS	PROFILE	SOIL DESCRIPTION (ASTM D 2488)	% Moisture	Dry Density (pcf)	Unc. Cor. (pcf)	U.C. (pcf) by P.P.	% Passing 200	REMARKS
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0.0			SM	SILTY SAND; Dark Brown, moist, loose.						
-1.0										
-2.0										
-3.0				SILTY SAND; Yellowish Brown, moist, medium dense to dense.	25	86				
-4.0										
-5.0				Halt exploration at 4.0 feet below ground surface; No groundwater encountered.						
-6.0										
-7.0										
-8.0										
-9.0										
-10.0										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD LOG

Page Number 1 of 1



Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Proposed Teen/Family Center

JOB NUMBER: 011034.040

LOCATION: SW Corner of Proposed Addition

DATE DRILLED: 11/10/2011

GROUND SURFACE ELEVATION: Approx 152 Feet MSL

TOTAL DEPTH OF BORING: 6.25 Feet

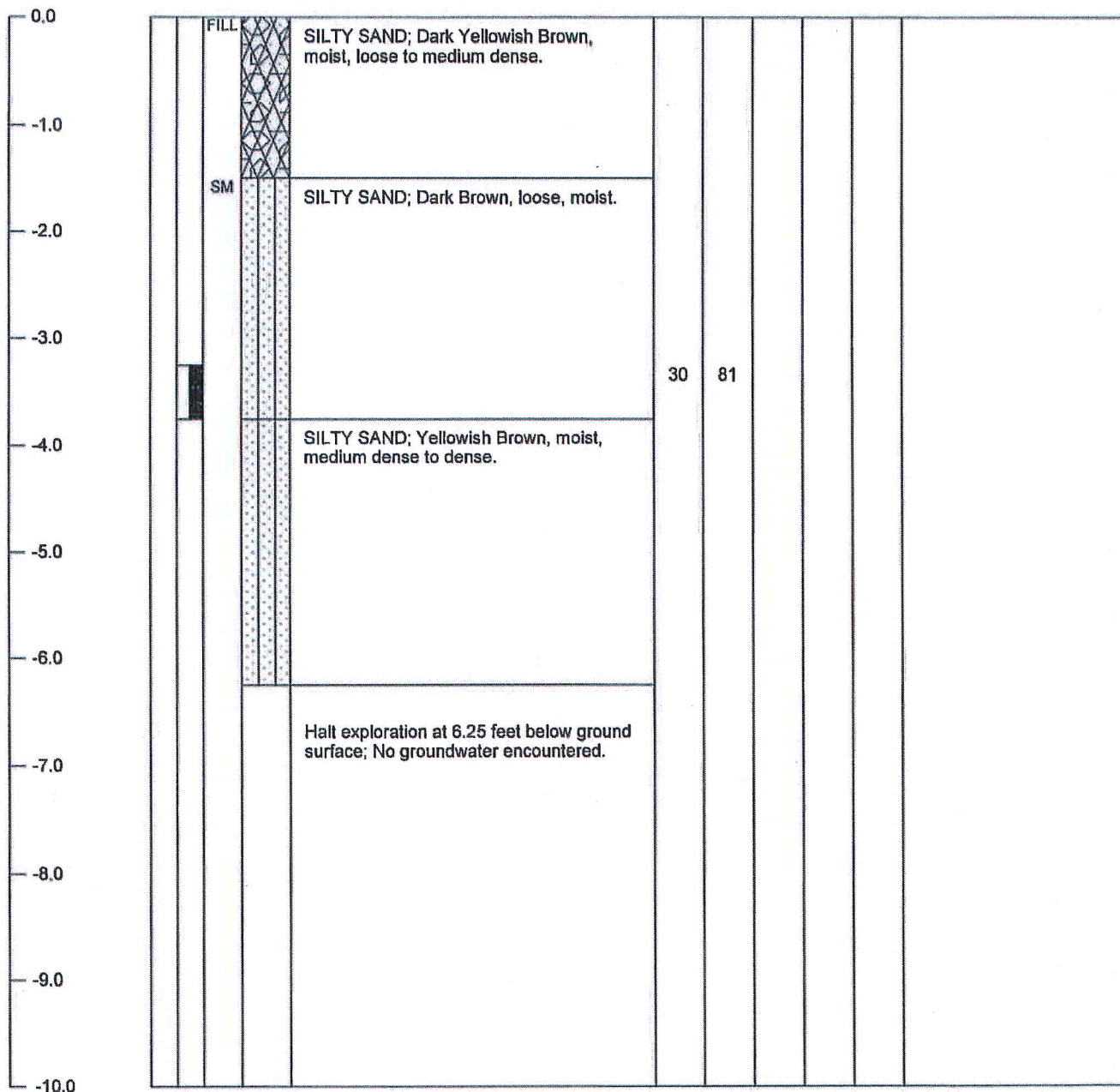
EXCAVATION METHOD: 3" Hand Auger

SAMPLER TYPE: 2.5-inch thin-walled tube

LOGGED BY: PRS

**BORING
NUMBER
HB-4**

DEPTH (FT)	BULK SAMPLES TUBE SAMPLE	USCS	PROFILE	SOIL DESCRIPTION (ASTM D 2488)	% Moisture	Dry Density (pcf)	Unc. Cor. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
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The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD LOG

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