Construction Project Manual

SET NO.

JUNE 2023

THINK LEARN BE MORE TOGETHER

POCATELLO/CHUBBUCK SCHOOL DISTRICT 25

PV-TEC BUILDING REMODEL

CHUBBUCK, IDAHO

Architects Project No. 2306

JENSEN•HAYES•SHROPSHIRE
ARCHITECTS, P.A.
125 North Garfield - Pocatello, Idaho
Phone (208) 232-1223 - Fax (208) 232-1226

PROJECT MANUAL

POCATELLO/CHUBBUCK SCHOOL DISTRICT #25

PV-TEC BUILDING REMODEL
CHUBBUCK, IDAHO
JHS PROJECT #2306

OWNER

POCATELLO/CHUBBUCK SCHOOL DISTRICT
3115 Pole Line Rd
Pocatello, Idaho 83201

ARCHITECT

JHS ARCHITECTS
125 N. Garfield
Pocatello, Idaho 83204
(208) 232-1223

MECHANICAL ENGINEER

ENGINEERED SYSTEMS ASSOCIATES
1355 E. Center Street
Pocatello, Idaho 83201
(208) 233-0501

ELECTRICAL ENGINEER

PAYNE ENGINEERING
1823 E. Center Street
Pocatello, Idaho 83204
(208) 233-4439

June 2023

Pocatello School District #25
3115 Pole Line Rd.
Pocatello, ID 83201

You are hereby invited to submit a bid for:

PROJECT TITLE: PV-TEC Building Remodel

LOCATION: PV-TEC – 4200 N. Hawthorne Rd, Chubbuck, Idaho

BID DUE DATE: 10:00 AM on Tuesday, August 8, 2023

PRE-BID MEETING: 1:00 PM on Wednesday, July 26, 2023

Sealed bids will be received by the Board of Trustees, Pocatello / Chubbuck School District #25, 3115 Pole Line Rd., Pocatello, Idaho for the above-named project until **Tuesday, August 8, 2023 at 10:00 am.** Bid instructions, documentation, and specifications are available to view at the following locations:

Bonneville Blueprint 1802
Curtis Ave.
Idaho Falls, ID 208-522-0010

Idaho AGC
1649 W. Shoreline Dr. Ste 100
Boise, ID
208-344-2531

Mountainlands Area Plan
Room 583 W 3560 S, Ste 4
Salt Lake City, UT 84115
801-288-1188

Plans will be available at no charge via the respective online plans rooms mentioned above. One (1) hard copy set of plans and specifications may be purchased at Bonneville Blueprint for a refundable deposit of $50 per set.

Bids will be publicly opened immediately after the bid due date and time. Bids are to be returned via mail or hand delivered to **Pocatello / Chubbuck School District 25, 3115 Pole Line Rd., Pocatello, ID 83201.**

Questions regarding this Request for Bid must be submitted in writing and received by the Pocatello/Chubbuck School District #25 **NO LATER THAN 4:00 pm, August 7, 2023.** Questions received after this date will not be considered.

The School District will not be responsible for verbal interpretations. Questions will be answered by written addenda and distributed to the above-mentioned plans rooms. All addenda issued during the bid period will be incorporated into the contract. Addenda issued prior to bidding shall be acknowledged on the Bid Form. Failure to acknowledge addenda may be cause for rejection of bid as non-responsive.

Submit questions in writing via email, U.S. Postage or fax to:

JHS Architects, P.A. Attn:
Scott Lloyd
scott@jhsarchitects.com
125 N. Garfield Ave
Pocatello, Idaho 83204

Please note that a Pre-Bid Meeting will be held on **July 26, 2023 at 1:00 pm.** Attendance is required. Meet at the school's east entry of the building. Building address: 4200 N. Hawthorne Rd, Chubbuck Idaho

AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

PV-TEC Building Remodel
4200 Hawthorne Rd
Chubbuck, ID 83202

THE OWNER:
(Name, legal status, address, and other information)

Pocatello/Chubbuck School District #25
3115 Pole Line Rd
Pocatello, ID 83201

THE ARCHITECT:
(Name, legal status, address, and other information)

JHS Architects, P.A.
125 Garfield Avenue
Pocatello, ID 83204

TABLE OF ARTICLES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.6** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

Bidding Documents are available at the following locations:

- Idaho AGC - 1649 W. Shoreline Dr., Ste 100, Boise, ID
  Phone: 208-344-2531
- Mountainlands Area Plan Room – 583 W. 3560 S. Ste 4, Salt Lake City, UT

Phone: 801-288-1188

- Bonneville Blueprint – 1802 Curtis Ave. – Idaho Falls, ID
  Phone: 208-522-0010

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

Submit questions in writing via email to:
JHS Architects, P.A.
Attn: Scott Lloyd
scott@jhsarchitects.com
125 N. Garfield Ave, Pocatello, Id, 83204

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.§ 3.3 Substitutions

(Paragraph deleted)

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

All addenda will be transmitted via email from:
JHS Architects, P.A.
Scott Lloyd
scott@jhsarchitects.com
125 N. Garfield Ave, Pocatello, Id, 83204

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:
(Insert the form and amount of bid security.)

To be considered, all proposals must be accompanied by an acceptable security, in an amount no less than five (5) percent of the total amount of the bid including additive alternates. The security may be in form of a bond or certified cashier's check

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.3.1 The bidder's security will be returned promptly after the owner and the accepted bidder have executed a contract, or if no award has been made within 30 days after the opening of bids upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of the bid.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning thirty (30) days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

Submit copy to: Pocatello/Chubbuck School District #25
Attn: Business Office
3115 Pole Line Rd.
Pocatello, ID 83201

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice

of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:
(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

The bid security shall be returned to the Contractor

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders in attendance. A formal summary of the Bids will be available upon request adter the Board of Trustees award the bid.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

§ 5.4 Naming of Sub-Contractors

§ 5.4.1 Section 67-2310, Idaho Code, requires general (prime) contractors to include in their bid the name of subcontractors who shall, in the event the contractor secures the contract, subcontract the plumbing, heating and air conditioning, and the electrical work under the general (prime) contract. Failure to name subcontractors as required by this section shall render any bid submitted by a general (prime) contractor unresponsive and void. Subcontractors named in accordance with the provisions of this section must possess an appropriate license or certificate of competency by the state of Idaho covering the contracted work classification in which the subcontractor is named.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.§ 6.3 Submittals

(Paragraph deleted)

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.1.1 In conformance to Idaho Code, 54-1926, performance bond and labor and material payment bond are required for this project; each in the amount of 100% of the contract amount, and by a surety company authorized to do business in Idaho. These bonds must be in a form acceptable to Owner or acceptable government obligations.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

100% of the contract sum

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to

commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

(Paragraph deleted)
§ 7.2.2.Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 Pocatello/Chubbuck School District #25 Construction Contract

.

.2

(Paragraphs deleted)

AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

BID PROPOSAL

TO:

Gentlemen:

The Bidder, in compliance with your invitation for bids for the construction of the PV-TEC Building Remodel having examined the specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, and to provide the service and insurance in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written "Notice to Proceed" of the Owner and to substantially complete the project within 548 consecutive calendar days thereafter, as stipulated in the specifications. Bidder further agrees to pay as liquidated damages, the sum of $ 500 for each consecutive calendar day thereafter as hereinafter provided in Paragraph 5 of the Construction Contract..

Bidder acknowledges receipt of addenda No. _____.

BASE PROPOSAL: Bidder agrees to perform all of the base proposal work described in the specifications and shown on the plans for the sum of

_____Dollars ($_____).

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by Article 7 of the Instructions to Bidders including paragraph 7.1.1.4 of the Instructions to Bidders.

The bid security attached in the amount of 5% of the bid amount is to become the property of the Owner in the event the contract and bond are not executed within the time set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Plumbing (Name)_____

(Address_____

Idaho Plumbing Contractors License No. _____

Heating/Air Conditioning (Name)_____

(Address)_____

Electrical (Name)_____

(Address)_____

Idaho Electrical Contractors License No. _____

Dated at _____this _____ day of_____ 2023.

Respectfully submitted,

By:_____
(Company)

_____
(Business Address)

_____

_____
(Authorized Signature)

_____
(Title)

_____
(Telephone Number)

(Seal - if bid is by a corporation)

END OF BID PROPOSAL

POCATELLO/CHUBBUCK SCHOOL DISTRICT NO. 25
Bannock County, Idaho

CONSTRUCTION CONTRACT

This contract is made and entered into, effective as of _____, by and between School District No. 25, Bannock County, Idaho, ("Owner"), and _____ ("Contractor"), a company duly licensed as a public works contractor in the State of Idaho, as follows:

1. **DESCRIPTION OF WORK.** Contractor shall perform the following described work, in accordance with the contract plans and specifications, more particularly described below:

The remodel and building addition of the new PV-TEC building at 4200 Hawthorne Rd, Chubbuck, Idaho

2. **CONTRACT DOCUMENTS.** The Contract Documents consist of this Agreement, Drawings Specifications, Addenda issues prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement; these form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreement either written or oral.

3. **CONTRACT PRICE.** Owner agrees to pay Contractor, for the work described, the total price of $_____. Payment of this amount is subject to additions or deductions in accordance with the provisions of this contract.

4. **UNIT PRICES**. NONE

5. **LIQUIDATED DAMAGES.** Contractor shall be required to pay Owner as liquidated damages the sum of $500 for each calendar day, after the scheduled completion date, that the project is unfinished.

6. **PAYMENT SCHEDULE.** Based upon applications for payment, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in these Contract Documents.

Each Application for Payment shall be based on the most recent statement of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Owner may require. This schedule, unless objected to by the Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment.

Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for

materials, or equipment, which have not been delivered and stored at the site.

Owner shall make final payment to Contractor no later than 30-days after the issuance of the final Certificate for Payment or within thirty (30) days after the work is completed, if the contract is at that time fully performed, and subject to the condition that final payment shall not be due until Contractor has delivered to Owner a complete release of all liens arising out of the contract, or receipts in full covering all labor, materials, and equipment for which a lien could be filed. In the event that progress payments will be made under this contract, the payment schedule will be set forth below or in an attachment hereto:

> *Provided that an Application for Payment is received by the Owner not later than the Twenty Fifth (25th) day of a month, the Owner shall make payment to the Contractor not later than the Fifteenth (15th) day of the following month. If an Application for Payment is received by the Owner after the application date fixed above, payment shall be made by the Owner not later than Thirty (30) days after the Owner receives the Application for Payment."*

7. **RETAINAGE**. Owner will retain five percent of the contract price from the final payment to be released to the Contractor when the Owner receives a tax release from the Idaho State Tax Commission. The five percent retainage may be used by Owner to offset any and all losses incurred by Owner in the course of the performance of the Contract by Contractor, including but not limited to tax liens, defective performance, defective products – including those of subcontractors or other damage caused by Contractor in the performance of this Contract. Owner shall provide Contractor with a written itemization of all sums retained by Owner at the time of its issuance of final payment. Under no circumstances shall Owner retain more than five percent of the contract price without written agreement of Contractor.

8. **EFFECT OF PAYMENT.** Owner by making payment waives all claims except those arising out of:

A. Faulty work appearing after final payment is made;

B. Work that does not comply with this contract;

C. Outstanding claims of lien; or

D. Failure of Contractor to comply with any special guarantees required by the contract.
Contractor, by accepting final payment, waives all claims except those that he has previously made in writing, and which remain unsettled at the time of acceptance.

9. **DATE OF COMMENCEMENT**. Construction under this contract shall begin on the date set forth on a notice to proceed issued by the Owner. The Contract Time shall be measured from the date of commencement of the Work.

10. **SUBSTANTIAL COMPLETION.** The Contractor shall achieve substantial completion of the entire Work no later than (548) calendar days from the date of commencement of the Work.

11. **PROJECT PHASING AND MILESTONES.** It is the owner's intent to occupy portions of the building for the 2024-2025 academic school year upon the approval by Pocatello-Chubbuck School District #25. The Contractor shall complete the following spaces by August 1, 2024:

- Vestibule 100
- Corridor 101
- Administration 102
- Office 103
- Restroom 104
- Storage 105
- Conference 106
- EMT/Fire Classroom 139
- EMT/Fire Shop 140
- Construction 142
- Welding Classroom 143
- Welding Locker 143A
- Welding 144
- CNC Room 144A
- Restroom 144B
- Storage 144C
- Storage 144E
- Corridor 144F
- Vestibule 145
- Cafeteria 176
- Corridor 178

12. **RESPONSIBILITIES OF OWNER**. Owner shall furnish all necessary surveys for the work, and shall secure and pay for easements for permanent structures or permanent changes in existing structures or facilities on the work site, or which are necessary for its proper completion.

Owner reserves the right to let other contracts for construction work to be performed at the work site. Contractor shall cooperate with all other contractors to the effect that their work shall not be impeded by his construction, and shall give such other contractors access to the work site necessary to perform their contracts.

13. **RESPONSIBILITIES OF CONTRACTOR.** Contractor's duties and rights in connection with the above-described project are as follows:

A. Responsibility for the Supervision of Construction. Contractor shall be solely responsible for all construction under this contract, including the techniques, sequences, procedures, and means, and for coordination for all work. Contractor shall supervise and direct the work to the best of his ability, and give it all the attention necessary for such proper supervision and direction. The project shall be completed in a proper, workmanlike manner, consistent with the highest standards of quality in the community.

B. Furnishing of Labor, Materials, etc. Contractor shall provide and pay for all labor, materials, and equipment, including tools, equipment, and machinery, utilities, including water, transportation, and all other facilities and services necessary for the proper completion of work on the project in accordance with the contract. Ninety-five percent (95%) of Contractor's employees must be bona fide Idaho residents as required by Idaho Code § 44-1001.

C. Procurement of Licenses and Permits. Contractor shall pay all taxes required by law in connection with work on the project in accordance with this contract including sales, use, and similar taxes, and shall secure all licenses and permits necessary for proper completion of the work, paying the fees for such licenses and permits. Contractor represents that he is authorized to do business in the State of Idaho and, pursuant to Idaho Code §63-1502, shall provide evidence that he is so qualified.

D. Payment of Taxes.

i. Pursuant to Idaho Code §63-1503, Contractor agrees to pay promptly when due all taxes (other than on real property), excises and license fees due to the state, its subdivisions, and municipal and quasi-municipal corporation therein accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term. If the said taxes, excises, and license fees are not payable at the end of said term, but liability for the payment thereof exists, even though the same constitute liens upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof. In the event of the Contractor's default in the payment or securing of such taxes, excises, and license fees, the Contractor hereby consents that the Owner may withhold from any payment due to the Contractor under this contract, the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing units to which said Contractor is liable.

ii. Pursuant to Idaho Code §63-1502, Contractor shall provide evidence that he has paid or secured to the satisfaction of the respective taxing units, as defined in Idaho Code §63-1501, all taxes for which he or his property is liable then due or delinquent.

iii. Pursuant to Idaho Code §63-1504, before Owner shall approve any claim on account of construction work performed as required by this contract, Contractor (or any sub-contractor claimant) must furnish evidence to Owner that he (i.e. Contractor or any sub-contractor, as the case may be) has paid all taxes, excises and license fees due to the state and its taxing units, due and payable during the term of this contract for such construction, and that he has secured all such taxes, excises, and license fees liability for the payment of which has accrued during the term of this contract, notwithstanding they may not yet be due or payable.

E. Except as otherwise provided in Idaho Code §44-1002, Contractor must employ ninety-five percent (95%) bona fide Idaho residents as employees on the project unless fifty (50) or less persons are employed in which event Contractor may employ ten percent (10%) nonresidents, provided however, in any case Contractor must give preference to the employment of bona fide residents in the performance of said work.

F. Compliance with Construction, State, and Federal Laws and Regulations. Contractor shall comply with all laws and ordinances, and the rules, regulations, or orders of all public authorities relating to the performance of the work under and pursuant to this contract. If any of this contract is at variance with any such laws, ordinances, rules, regulations, or orders, he shall notify Owner promptly on discovery of such variance. The Contractor must notice the District of any Registered Sex Offenders working on School Property and obtain written permission from the District prior to the commencement of any work.

G. Responsibility for Negligence of Employees and Subcontractors. Contractor assumes full responsibility for acts, negligence, or omissions of all his employees on the project, for those of his subcontractors and their employees, and for those of all other persons doing work under a contract with him. Smoking and alcohol are prohibited on school property. Unauthorized persons are not allowed on the job site.

H. Warranty of Fitness of Equipment and Materials. Contractor represents and warrants to Owner that all equipment and materials used in the work, and made a part of the structures on such work, or placed permanently in connection with such work, will be new, of good quality, free of defects, and in conformity with this contract. It is understood and agreed between the parties to this contract that all equipment and materials not so in conformity will be considered defective.

I. Clean-up. Contractor agrees to keep the work premises and adjoining ways free of waste material and rubbish caused by his work or that of his subcontractors. Contractor further agrees to remove all such waste material and rubbish on termination of the project, together with all of his tools, equipment, machinery, and surplus materials. Contractor agrees, on terminating his work at the site, to conduct general clean-up operations, including the cleaning of all glass surfaces, paved streets and walks, steps, and interior floors and walls.

J. Indemnity and Hold Harmless Agreement.

i. Contractor agrees to indemnify and hold harmless Owner, and its agents and employees, from and against any and all claims, damages, losses, and expenses, including reasonable attorney's fees in case it shall be necessary to file an action, arising out of performance of the work in this contract, that is (a) for bodily injury, illness, or death, or for property damage, including loss of use, and (b) caused in whole or in part by Contractor's intentional and/or negligent act or omission, the act of an employee or agent of the Contractor or that of a subcontractor.

ii. Contractor further agrees to indemnify, save harmless, and make whole, Owner from any and all defects appearing or developing in the workmanship or materials performed or furnished under this Contract for a period of one (1) year after the acceptance thereof by Owner.

K. Performance and Payment Bonds. Contemporaneously with the execution of this contract, Contractor shall provide performance and payment bonds in the form required by Idaho Code § 54-1926. The bonds shall be one hundred percent (100%) of the contract price and shall provide Owner with security for faithful performance of the contract and also provide security for protection of persons supplying labor and/or materials for the contract.

14. **TIME OF ESSENCE; EXTENSION OF TIME.** All times stated in this contract are of the essence. The time stated in this contract may be extended by a change order from Owner for such reasonable time as it may determine, when in its opinion Contractor is delayed in work progress by changes ordered, labor disputes, fire, prolonged transportation delays, injuries, or other causes beyond Contractor's control or which justify the delay. Otherwise, in the event the project is not completed by the scheduled completion date, Contractor shall be subject to liquidated damages.

15. **SUBCONTRACTORS.** Contractor agrees to furnish Owner, prior to the execution of this contract, with a list of names of subcontractors to whom he proposes to award the principal portions of the work to be subcontracted by him.

A subcontractor, for the purposes of this contract, shall be a person with whom Contractor has a direct contract for work at the project site.

Contractor agrees not to employ a subcontractor to whose employment Owner reasonably objects, nor shall Contractor be required to hire a subcontractor to whose employment he reasonably objects.

All contracts between Contractor and subcontractor shall conform to the provisions of this contract, and shall incorporate in them the relevant provisions of this contract.

16. **ARBITRATION.** All claims and disputes relating to this contract shall be subject to arbitration at the option of either Owner or Contractor in accordance with the Arbitration Rules of the American Arbitration Association for the construction industry.

A. A formal written demand for Arbitration shall be filed with BOTH the other party to this contract AND with the American Arbitration Association, within a reasonable time after the dispute has arisen, but NOT LATER THAN SIXTY (60) DAYS after the claim or dispute arose.

B. A "claim" or "dispute" under this Paragraph arises when the claiming or disputing party FIRST knew or reasonably should have known of the subject matter of the "claim" or "dispute." The purpose of this Paragraph is to encourage the prompt resolution of any and all "claims" or "disputes." As a result, any doubts regarding the determination of when such notice occurred shall be resolved by giving all due deference to the EARLIEST date of notice. The determination of when a "claim" or "dispute" occurred shall not be determined by reference to the date where an "impasse" had occurred.

C. The Arbitrator is authorized to award reasonable attorney fees to the prevailing party.

17. **INSURANCE.** Contractor agrees to keep in force at his own expense during the entire period of construction on the project such liability insurance as will protect him from claims, under workers' compensation and other employee benefit laws, for bodily injury and death, and for property damage, that may arise out of work under this contract, whether directly or indirectly by Contractor, or directly or indirectly by a subcontractor. The minimum liability limits of such insurance shall not be less than the limits required by law for that type of damage claim. Proof of such insurance shall be filed by Contractor with Owner within a reasonable time after execution of this contract. Contractor shall be responsible for insuring all construction materials, tools and equipment stored at the job site.

18. **CORRECTING WORK.** When it appears to the Owner or the Contractor during the course of construction that any work does not conform to the provisions of this contract, Contractor shall make necessary corrections so that such work will so conform, and in addition will correct any defects caused by faulty materials, equipment, or quality of performance in work supervised by him or by a subcontractor, appearing within one (1) year from the date of final payment, or within such longer period as may be prescribed by law.

19. **WORK CHANGES.** Owner reserves the right to order work changes in the nature of additions, deletions, or modifications, without invalidating this contract, and agrees to make corresponding adjustments in the contract price and time for completion.

All changes will be authorized by a written change order signed by Owner. The change order will include conforming changes in the contract price and completion time.

Work shall be changed, and the contract price and completion time shall be modified only as set out in the written change order. No work is to be initiated without the written change order in place.

Any adjustment in the contract price resulting in a credit or a charge to Owner shall be determined by mutual contract of the parties, or by arbitration, before starting the work involved in the change.

The total allowance for combined overhead and profit for changes shall be included in the total cost to the owner and shall be based on the following schedule.

A. For the Contractor, 10% over cost.

B. For the Sub-Contractor, 15% over cost to be divided 10% for Sub-Contractor and 5% for Contractor.

C. For any Sub-Subcontractor, 15% over cost to be divided 5% for Contractor, 5% for Sub-Contractor, and 5% for Sub-Subcontractor.

20. **CONTRACTOR'S TERMINATION.** Owner may, on five days' notice to Contractor, terminate this contract before the completion date specified in this contract, or extended times provided by approved change orders, and without prejudice to any other remedy they may have, if Contractor defaults in performance of any provision in this contract, or fails to carry out his work in accordance with the provisions of the contract documents. If the unpaid balance on the contract price at the time of such termination exceeds the expense of finishing the work, owners will pay such excess to Contractor. If the expense of finishing the work exceeds the unpaid balance at the time of termination, Contractor agrees to pay the difference to Owners.

21. **GOVERNING LAW.** It is agreed that this contract shall be governed by, construed, and enforced in accordance with the laws of the State of Idaho.

22. **GENDER AND NUMBER.** As used in this contract, the masculine, feminine, or neuter gender, and the singular or plural number, each shall be deemed to include the other whenever the context so indicates.

23. **ATTORNEY FEES.** In the event that any action, including Arbitration, is filed in relation to this contract, the unsuccessful party in the action shall pay to the prevailing party, in addition to all the sums that either party may be called on to pay at Arbitration, a reasonable sum for the successful party's attorney's fees.

24. **ENTIRE AGREEMENT.** This contract shall constitute the entire agreement between the parties and any prior understanding or representation of any kind preceding the date of this contract shall not be binding upon either party except to the extent incorporated in this contract.

25. **MODIFICATION OF AGREEMENT.** Any modification of this contract or additional obligation assumed by either party in connection with this agreement shall not be binding upon either party except to the extent an amendment in writing, executed by both the Owner and the Contractor.

26. **NOTICES.** Any notice provided for or concerning this contract shall be in writing and be deemed sufficiently given when sent by certified or registered mail and addressed as follows:

To: Owner
Pocatello-Chubbuck School District No. 25
3115 Pole Line Rd.
Pocatello, Idaho 83201-6119

To: Contractor

27. **ASSIGNMENT OF RIGHTS**. The rights of each party under this contract are personal to that party and may not be assigned or transferred to any other person, firm, corporation, or other entity without the prior, express, and written consent of the other party.

28. **PARAGRAPH HEADINGS**. The titles to the paragraphs of this contract are solely for the convenience of the parties and shall not be used to explain, modify, simplify, or aid in the interpretation of the provisions of this contract.

IN WITNESS WHEREOF the parties have executed this contract on the date indicated below:

CONTRACTOR:

Dated: _____

By: _____

Attest: _____

OWNER:
Pocatello/Chubbuck School District No. 25
Bannock County, Idaho

Dated: _____

By: _____

Jonathan R. Balls
Director of Business Operations

Attest: _____

AIA® Document A201® – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
PV-TEC Building Remodel
4200 Hawthorne Rd
Chubbuck, ID 83202

THE OWNER:
(Name, legal status and address)
Pocatello/Chubbuck School District #25
3115 Pole Line Rd
Pocatello, ID 83201

THE ARCHITECT:
(Name, legal status and address)
JHS Architects, P.A.
125 Garfield Avenue
Pocatello, ID 83204

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

INDEX
(Topics and numbers in bold are section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.§ 1.1.4.1 The entire Project shall be considered as one "portion" unless separate areas of phases are designated in the Contract Documents for separate completion times of separate areas of completion and occupancy. This definition is for use in determining release of retainage.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as

binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the

Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

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

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified **only** under the following conditions:

.1 Required product cannot be supplied in time for compliance with Contract time requirements.

.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

.3 Substantial advantage is offered to Owner after deducting offsetting disadvantages including delays, additional compensation to Architect/Engineer for redesign, investigation, evaluation and other necessary services, and similar considerations.

§ 3.4.2.2 By making requests for substitutions based on Clause 3.4.2.1 above, the Contractor:

.1 represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

.2 represents that he will provide the same warranty for the substitution that he would for that specified;

.3 certifies that the cost data presented is complete and includes all related costs under separate contracts, but excludes the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have

control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and

Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule. In the event a Change Order increased the Contract Sum, the Contractor shall include the Work covered by such Change Order in Application for Payment as if such Work were originally part of the Project and Contract Documents.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract

Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be

reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 Notwithstanding anything to the contrary in the Contracts Documents, an extension in the Contract Time, to the extent permitted under Paragraph 8.3.1, shall be the sole remedy of the Contractor for any of the following:

.1 delay in the commencement, prosecution or completion of the Work;
.2 hindrance or obstruction in the performance of the Work;
.3 loss of productivity;
.4 quarantine, epidemic, or pandemic; or
.5 other similar claims (collectively referred to in this subparagraph 8.3.3 as Delays). This will be the remedy whether or not such Delays are foreseeable, unless a Delay is caused by acts of the Owner constituting active inference with the Contractor's performance of the Work, and only to the extent such acts continue after the Contractor furnishes the Owner with written notice of such interference. In no event shall

the Contractor be entitled to any compensation or recovery of damages, in connection with any Delay, including, without limitation, consequential damages, lost opportunity costs, impact damages, or other similar remuneration.
The Owner's exercise of any of its rights or remedies under the Contract Documents including, without limitation, ordering changes in the Work, and regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as active interference with the Contractor's performance of the Work

§ 8.3.4 If the Contractor submits a progress report indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a separate contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the

Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the

time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the

Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work to comply with the requirements of the Contract Documents; or

.3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 LIQUIDATED DAMAGES

§ 9.11.1 The Owner will suffer financial loss if the Project is not Substantially Complete on the date set forth in the Contract Documents. The Contractor (and his Surety) shall be liable for and shall pay to the Owner the sums hereinafter stipulated as fixed, agreed and liquidated damages for each calendar day of delay until the Work is substantially completed:

Five Hundred Dollars ($500.00)

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone

directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE
The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

(Paragraphs deleted)
§ 11.3.7 WAIVERS OF SUBROGATION
The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND
§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.5 INDEMNITY
§ 11.5.1 The Contractor shall indemnify, defend and save harmless the Owner, the Architect, and the Architect's Consultants from and against all claims, damages, costs, legal fees, expenses, actions and suits whatsoever including injury or death of others or any employee of the Contractor, subcontractors, or the sub-subcontractors, agents or employees, caused by failure to comply fully with any term or condition of the contract, or caused by damage to or loss of use of property, directly or indirectly, by the carrying out of the work, or caused by any matter or thing done, permitted or omitted to be done by the Contractor, his agents, subcontractors or employees and occasioned by the negligence of the Contractor, his agents, subcontractors or employees.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Contractor shall bear costs of tests, inspections or approvals that are required and inspections or approvals deemed necessary by the Architect.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: 2306 PV TEC BUILDING AND REMODEL

B. Owner's Name: Pocatello-Chubbuck School District #25.

C. The Project consists of the construction of The building construction of classrooms within the existing building, 78,225 sq ft, and the construction of a new building addition of approx. 18,410 sq. ft. .

D. Architect's Name: JHS Architects, P.A.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5200 - Agreement Form.

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 4100.

B. Scope of alterations work is indicated on drawings.

1.04 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by the Owner before Substantial Completion. Some items include:
   1. Kitchen Equipment.
   2. Welding Shop Equipment.
   3. Furnishings.
   4. Appliances
   5. Small equipment.

1.05 OWNER OCCUPANCY

A. the Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. the Owner intends to occupy the Project by the date stated in the Agreement as the contract completion date.

C. Cooperate with the Owner to minimize conflict and to facilitate the Owner's operations.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Contractor shall take appropriate precautions to protect existing portions of the site designated to remain.

B. Arrange use of site and premises to allow:
   1. the Owner occupancy.

C. Provide access to and from site as required by law and by the Owner:
   1. Do not obstruct roadways, sidewlks, or other public right-of-ways without permit.

D. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.

E. Utility Outages and Shutdown:
   1. Coordinate shutdown of utility services with owner to minimize impact on the occupied building, arranged at least 24 hours in advance with the Owner.

1.07 WORK SEQUENCE

A. Coordinate construction schedule and operations with the Owner.

B. Coordinate construction schedule and operations with JHS Architects.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Change procedures.

1.02 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to JHS Architects for approval.

B. Forms filled out by hand will not be accepted.

C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.

D. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to JHS Architects for approval.

C. Forms filled out by hand will not be accepted.

D. Present required information in typewritten form.

E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.

F. Execute certification by signature of authorized officer.

G. Submit one electronic and three hard-copies of each Application for Payment.

H. When JHS Architects requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, JHS Architects will issue instructions directly to Contractor.

B. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

C. For other required changes, JHS Architects will issue a document signed by the Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, JHS Architects will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within ____ days.

E. Contractor may propose a change by submitting a request for change to JHS Architects, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by JHS Architects for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by JHS Architects.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by JHS Architects without a quotation from Contractor, the amount will be determined by JHS Architects based on the Contractor's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: JHS Architects will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2100
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contingency allowance.

B. Lump sum allowance.

1.02 RELATED REQUIREMENTS

A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

A. Use the contingency allowance as directed by Architect for Owner's purposes and only by credit/debit Change Orders that indicate amounts to be charged to the allowance

B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

C. Funds will be drawn from the Contingency Allowance only by Change Order.

D. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 LUMP SUM ALLOWANCE

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.05 ALLOWANCES SCHEDULE

A. Contingency Allowance: Include the stipulated sum/price of $50,000 for use upon Owner's instructions.

B. Architectural Allowance: Include the stipulated sum/price of $30,000 for use upon Architect's instructions

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

B. Substitutions: See General Conditions for definition.

1.03 REFERENCE STANDARDS

A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage); Current Edition.

B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to the Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
   1. the Owner will consider requests for substitutions only if submitted at least 5 days prior to the date for receipt of bids.

B. Submittal Form (before award of contract):
   1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
   1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request (After Bidding/Negotiating). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by JHS Architects, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience within 14 days of discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by JHS Architects, in order to stay on approved project schedule.
   1. In addition to meeting general documentation requirements, document how the requested substitution benefits the the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
   2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
   3. Bear the costs engendered by proposed substitution of:
      a. the Owner's compensation to the JHS Architects for any required redesign, time spent processing and evaluating the request.

3.04 RESOLUTION

A. JHS Architects may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. JHS Architects will notify Contractor in writing of decision to accept or reject request.
   1. JHS Architects's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.
B. Preconstruction meeting.
C. Site mobilization meeting.
D. Progress meetings.
E. Construction progress schedule.
F. Contractor's daily reports.
G. Progress photographs.
H. Coordination drawings.
I. Submittals for review, information, and project closeout.
J. Number of copies of submittals.
K. Requests for Interpretation (RFI) procedures.
L. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: General product requirements.

1.03 REFERENCE STANDARDS

A. AIA G716 - Request for Information; 2004.
B. AIA G810 - Transmittal Letter; 2001.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

1.05 PROJECT COORDINATOR

A. Project Architect: Scott Lloyd, JHS Architects.
B. Cooperate with the Architect in allocation of mobilization areas of site; for field offices and sheds, for Contractor access, traffic, and parking facilities.
C. During construction, coordinate use of site and facilities through the Architect.
D. Comply with Architect's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
E. Comply with instructions of the Architect for use of temporary utilities and construction facilities.
F. Coordinate field engineering and layout work under instructions of the Project Architect..
G. Make the following types of submittals to the JHS Architects .
    1. Requests for Interpretation.
    2. Requests for substitution.

3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Coordination drawings.
9. Closeout submittals.
10.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. The Owner will schedule a meeting prior to Notice to Proceed.

B. Attendance Required:
   1. the Owner.
   2. JHS Architects.
   3. Consulting Engineers.
   4. Contractor.
   5. Sub- Contractors.

C. Agenda:
   1. Execution of the Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties in Contract, Pocatello-Chubbuck School District #25 and JHS Architects.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

D. JHS will record minutes and distribute copies within two days after meeting to participants, with two copies to JHS Architects, the Owner, Contractor, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. Attendance Required:
   1. Contractor.
   2. the Owner.
   3. JHS Architects.
   4. Contractor's superintendent.
   5. Major subcontractors.

B. Agenda:
   1. Use of premises by the Owner and Contractor.
   2. the Owner's requirements.
   3. Construction facilities and controls provided by the Owner.
   4. Temporary utilities provided by the Owner.
   5. Survey and building layout.
   6. Security and housekeeping procedures.
   7. Schedules.
   8. Application for payment procedures.
   9. Procedures for testing.

10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

C. JHS will record minutes and distribute copies within two days after meeting to participants, with two copies to Contractor, DPW, JHS Architects, the Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. JHS Architects will schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Attendance Required: Job superintendent, major Subcontractors and suppliers, the Owner, JHS Architects, as appropriate to agenda topics for each meeting.
1. Contractor.
2. the Owner.
3. JHS Architects.
4. Special consultants.
5. Contractor's superintendent.

C. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

D. JHS will record minutes and distribute copies within two days after meeting to participants, with one copy to DPW, JHS Architects, the Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

B. See Supplementary Conditions Section 3.10 for requirements of CPM Schedule.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

3.05 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
1. Date.
2. High and low temperatures, and general weather conditions.
3. Safety, environmental, or industrial relations incidents.
4. Meetings and significant decisions.
5. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual

activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
6. Testing and/or inspections performed.
7. Signature of Contractor's authorized representative.

3.06 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to JHS Architects.

D. In addition to periodic, recurring views, take photographs of each of the following events:

E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
2. Consult with JHS Architects for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
2. File Naming: Include project identification, date and time of view, and view identification.
3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.07 COORDINATION DRAWINGS

A. Provide information required by Architect for preparation of coordination drawings.

B. Review drawings prior to submission to JHS Architects.

3.08 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
   a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
   b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to the Owner.
   a. Use AIA G716 - Request for Information .
3. Prepare using an electronic version of the form appended to this section.
4. Prepare using software provided by the Electronic Document Submittal Service.
5. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The the Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the JHS Architects, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. the Owner's, JHS Architects's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

H. Review Time: JHS Architects will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead

to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to the Owner.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify JHS Architects within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.09 SUBMITTAL SCHEDULE

A. Submit to JHS Architects for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified in Section - 01 3216 - Construction Progress Schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
   3. Format schedule to allow tracking of status of submittals throughout duration of construction.
   4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.10 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to JHS Architects for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Allow two weeks for initial review.

D. Samples will be reviewed for aesthetic, color, or finish selection.

E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for JHS Architects knowledge as contract administrator. No action will be taken.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 by 11 inches: Submit one copy; the Contractor shall make Contractor's own copies from original returned by the JHS Architects after making a file copy.

C. Documents for Information: Submit six.

D. Documents for Project Closeout: Make three reproduction of submittal originally reviewed. Submit one extra of submittals for information.

E. Samples: Submit the number specified in individual specification sections; one of which will be retained by JHS Architects.
   1. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   2. Transmit using approved form.
      a. Use Form AIA G810.
   3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
   6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Deliver submittals to JHS Architects at business address.
      b. Send submittals in electronic format via email to JHS Architects.
   7. Schedule submittals to expedite the Project, and coordinate submission of related items.
   8. Provide space for Contractor and JHS Architects review stamps.
   9. When revised for resubmission, identify all changes made since previous submission.
   10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
   11. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
   12. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Transmit each submittal with approved form.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: JHS Architects will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: JHS Architects will acknowledge receipt and review. See below for actions to be taken.

C. JHS Architects's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. JHS Architects's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
   2. Not Authorizing fabrication, delivery, and installation:

E. JHS Architects's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. References and standards.
C. Inspection agencies and services.
D. Control of installation.
E. Tolerances.
F. Manufacturers' field services.
G. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 4219 - Reference Standards.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Design Data: Submit for JHS Architects's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for the Owner's information.
C. Test Reports: After each test/inspection, promptly submit two copies of report to JHS Architects and to Contractor.
    1. Include:
        a. Date issued.
        b. Project title and number.
        c. Name of inspector.
        d. Date and time of sampling or inspection.
        e. Identification of product and specifications section.
        f. Location in the Project.
        g. Type of test/inspection.
        h. Date of test/inspection.
        i. Results of test/inspection.
        j. Compliance with Contract Documents.
        k. When requested by JHS Architects, provide interpretation of results.
D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to JHS Architects, in quantities specified for Product Data.
    1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
    2. Certificates may be recent or previous test results on material or product, but must be acceptable to JHS Architects.
E. Manufacturer's Field Reports: Submit reports for JHS Architects benefit as contract administrator.

1. Submit report in duplicate within 30 days of observation to JHS Architects for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

F. Erection Drawings: Submit drawings for JHS Architects's benefit as contract administrator or for the Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by JHS Architects or the Owner.

1.04 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from JHS Architects before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of JHS Architects shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from JHS Architects before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by JHS Architects and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by JHS Architects.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from JHS Architects before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with JHS Architects and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify JHS Architects and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by JHS Architects.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify JHS Architects and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with the Testing Agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by JHS Architects.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.
B. Temporary telecommunications services.
C. Temporary telephone and facsimile service.
D. Temporary sanitary facilities.
E. Temporary Controls: Barriers, enclosures, and fencing.
F. Security requirements.
G. Vehicular access and parking.
H. Waste removal facilities and services.
I. Project identification sign.
J. Field offices.

1.02 TEMPORARY UTILITIES - SEE SECTION 01 5100

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

1.03 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
   1. Provide a portable toilet unit within 180 feet of each building which is under construction.
   2. Provide additional portable toilet unit if number of workers at a particular building area exceed 25 persons.
B. Maintain daily in clean and sanitary condition.
C. At end of construction, return facilities to same or better condition as originally found.

1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
B. Provide protection for plants designated to remain. Replace damaged plants.
C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

A. Construction: Commercial grade chain link fence.
B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.07 SECURITY

A. Provide level of security deemed necessary to protect the interests of the Contractor at the option of the contractor.

B. Take measures to protect the Work from unauthorized entry, vandalism, or theft.

1.08 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and the Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.09 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.10 PROJECT SIGNS - SEE SECTION 01 5813

1.11 FIELD OFFICES - SEE SECTION 01 5213

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Procedures for the Owner-supplied products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

C. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Where other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions, as defined in Section 01 6116.
2. If wet-applied, have lower VOC content, as defined in Section 01 6116.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed unless pre-bid approved as an EQUAL.

C. Products Specified by Naming One or More Manufacturers with a Provision for "OR EQUAL": Use any Product or Manufacturer which is fully equal to that specified and comply with all submittal requirements.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

B. Instructions to Bidders specify time restrictions for submitting requests for substitutions (requests for equals) during the bidding period. Comply with requirements specified in this section.

C. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:
   1. Substitutions requested during the bidding period, and accepted prior to award of contract are refered to as "requests for approval as Equals".
   2. Revisions to Contract Documents requested by the Owner or Architect.
   3. Specified options of products and construction methods included in Contract Documents.
   4. Compliance with governing regulations and orders issued by governing authorities.

D. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

E. A Contractors substitution request will be recieved and considered by JHS when one or more of the following conditions are satisfied, as determined by JHS; otherwise requests will be returned without action except to record noncompliance with these requirements.
   1. Extensive revisions to Contract documents are not required.
   2. Proposed charges are in keeping with the general intent of contract documents.
   3. The request is not directly related to an "or equal" clause in the Contract Documents.
   4. The request is timely, fully documented and properly submitted.
   5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
   6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
   7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation sevices, increased cost of other construction by the Owner or separate contractors, and similar considerations.

8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the proposed substitution will overcome the incompatibility.
9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution will overcome the incompatibility.
10. The specified product or method of construction cannot provide a warranty required by the contract documents, and where the Contractor certifies that the proposed substitution will provide the required warranty.

F. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to the Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.

G. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The JHS Architects will notify Contractor in writing of decision to accept or reject request.

3.02 OWNER-SUPPLIED PRODUCTS

A. the Owner's Responsibilities:
1. Arrange for and deliver the Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review the Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with the Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Requirements for alterations work, including selective demolition, _____.
C. Pre-installation meetings.
D. Cutting and patching.
E. Surveying for laying out the work.
F. Cleaning and protection.
G. Starting of systems and equipment.
H. Demonstration and instruction of the Owner personnel.
I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
B. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
C. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.
C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.

1.04 PROJECT CONDITIONS

A. Use of explosives is not permitted.
B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
C. Protect site from puddling or running water. Do not allow water to pool around foundations, footings, or within building area. Provide water barriers as required to protect site from soil erosion.

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.05 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

G. After the Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of the Owner's activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify JHS Architects four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to JHS Architects, DPW Inspector, the Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify JHS Architects of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to JHS Architects the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Utilize recognized engineering survey practices.

H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

I. Periodically verify layouts by same means.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.

3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site weekly and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and _____.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify JHS Architects when work is considered ready for JHS Architects's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for JHS Architects's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing JHS Architects's and Contractor's comprehensive list of items identified to be completed or corrected and submit to JHS Architects.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to the Owner-occupied areas.

G. Notify JHS Architects when work is considered finally complete and ready for JHS Architects's Substantial Completion final inspection.

H. Complete items of work determined by JHS Architects listed in executed Certificate of Substantial Completion.

3.14 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the the Owner.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 00 7200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to JHS Architects with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. JHS Architects will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by the Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with JHS Architects comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with the Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

D. Project Finalization and Start-up:
   1. Provide training for owners maintenance staff concerning for operational systems (such as mechanical and electrical).
   2. Arrange training by factory representatives as required.
   3. Complete form for each system. See attached PF-1 at end of this Section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by the Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.

3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

H. Provide control diagrams by controls manufacturer as installed.

I. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

J. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for the Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of JHS Architects, Consultants, Contractor and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of JHS Architects, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.

N. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

O. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of JHS Architects, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with the Owner permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

E. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

F. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 DEFINITIONS

A. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.

B. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.

C. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: See Section 31 2323.

PART 3 EXECUTION

3.01 SCOPE

A. Remove portions of the building as shown on the drawings.

B. Remove paving and curbs required to accomplish new work.

C. Remove existing utilties as required to accomplish work.

D. Remove landscaping and vegetation within the are of new construction.

E. Remove other items indicated, for salvage, relocation, and recycling.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from the Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to the Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to the Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to JHS Architects before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 0516
UNDERSLAB VAPOR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

A. Section 03 3020 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete including forming, reinforcements and sealants.

1.03 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Samples: Submit samples of underslab vapor barrier to be used.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
   2. Thickness: 15 mils.
   3. Basis of Design:
      a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Reinforcing steel for concrete masonry units.

1.02 RELATED REQUIREMENTS

A. Section 03 3020 - Cast-in-Place Concrete.

B. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

B. ACI SP-66 - ACI Detailing Manual; 2004.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).

E. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement; 2006 (Reapproved 2011).

F. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.

G. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2014.

H. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

I. CRSI (DA4) - Manual of Standard Practice; 2009.

J. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.

1. Unfinished.

B. Reinforcing Steel Mat: ASTM A704/A704M, using ASTM A615/A615M, Grade 40 (40,000 psi) steel bars or rods, unfinished.

C. Cure surfaces in accordance with ACI 308R.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.
1. Review locations of spices with Architect.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as follows:
1. Footings and Concrete Formed Against Earth: 3 inch.
2. Slabs on Fill: 2 inch.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 4000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 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. Foundation walls.
   3. Curing Concrete Footing, Foundations & Slabs.
   4. Sealing Concrete Floor Slabs where scheduled on Finish Schedule.
   5. Building walls (exposed concrete) at the base of pre-engineered building.
   6. Setting of anchor bolts and rods in templates.
   7. Coordinate with Metal Building Contractor for layout templates and dimensions.
   8. Slabs-on-grade; both exterior slabs and building interior slabs.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 Concrete Forming and Accessories.

B. Section 31 1010 - Site Clearing.

C. Section 03 2000 Concrete Reinforcing.

D. Division 31 - Earthwork

E. Division 32 - Exterior Improvements

F. Division 33 - Utilities

G. Section 07 9005 Joint Sealers.

H. Section 13 3420 - Metal Building Systems to anchor bolts and layout.

I. Section 31 2316 Excavation

J. Section 32 1600 “Curbs, Gutters, Sidewalk, and Driveways”.

1.03 DEFINITIONS

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

B. Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified high quality architectural appearance. All exposed concrete shall be high quality architectural concrete.

1.04 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.

C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

E. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.

F. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.

G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2010.

H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2011.

I. ASTM C150 - Standard Specification for Portland Cement; 2011.

J. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2010b.

K. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

L. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2008).

1.05 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. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
   1. Shoring and Restoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.
   2. High Quality Architectural Concrete Formwork Shop Drawings: Show formwork construction including form-facing joints, construction and contraction joints, form joint sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete.

E. Welding certificates.

F. Qualification Data: For Installer and manufacturer.

G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

H. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Bonding agents.
   6. Adhesives.
   7. Semirigid joint filler.
   8. Joint-filler strips.
   9. Repair materials.
   10. Steel producer’s certificates of mill analysis including physical and chemical analysis of reinforcing steel.

I. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

J. Field quality-control test and inspection reports.

K. Minutes of preinstallation conference.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician. Installer is to have completed concrete Work with a minimum of 10 year record of successful in-service performance and similar in material, design, and extent to that indicated for this Project.
   1. Submit copy of Flatwork personnel certifications and years' experience for each with current firm and other firms.

B. 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.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. 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.

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 and Sections 1 through 5 and Section 7, "Lightweight Concrete."
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
   3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

F. Mockups: Cast concrete formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.
   1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect. For any exposed concrete walls, configure the Class A tolerance wall to include one 90 degree outside chamfered corner, one cold construction joint, one form joint, and other features as may be applicable.
   2. Approved panels may become part of the completed Work if undisturbed at time of Substantial Completion.
   3. Demolish mockup and remove from site when directed by Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

1.08 COORDINATION

A. Coordinate installation of masonry anchors with masonry system installers.

B. Obtain written approval from the appropriate waterproofing and thru-wall flashing manufacturers prior to installation of form coatings, form release agents, sealers, curing agents, surface coatings, concrete treatments, and other products applied to concrete surfaces indicated to receive waterproofing or thru-wall flashings. This includes manufacturers of floor waterproofing treatments above occupied space.

1.09 GUARANTEE

A. Special Guarantee: On form approved by Architect, without monetary limitation, in which manufacturer agrees to promptly repair or replace all components of concrete that fails in materials or workmanship, including material and labor, within specified guarantee period.
   1. Failures include pitting, spalling, cracking, honeycombing, surface color and texture irregularities, air bubbles, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Failure includes installation that does provide indicated slope to drain. Immediately repair or replace concrete and place in satisfactory in every particular, any guaranteed work upon written notice from the Architect and make good all damage to the buildings and grounds caused by said work, without cost to the Owner.
   2. Warranty Period: 2 years from date of Substantial Completion.

B. Guarantee for New Replacement Work: Provide similar, new 2-year guarantee from date of completion of replacement work.

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. Products: Subject to compliance with requirements, provide one of the products specified.

2.02 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Provide form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Forms for Smooth-Formed Finished Concrete: For concrete designated to receive direct finishes such as carpet, tile, EIFS skim coats, etc., provide
      a. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as one of the following:
         1) High-density overlay undamaged plywood, Class 1 or better; mill-release agent treated and edge sealed, 3/4-inch thick.
         2) B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
   2. Forms for Smooth-Formed Architectural Finished Exposed Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
      a. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as one of the following:
         1) Medium-density overlay, Class 1; mill-release agent treated and edge sealed.
         2) B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

D. 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.

E. 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 ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   2. Furnish ties with integral water-barrier plates to walls indicated to receive waterproofing.

2.03 ARCHITECTURAL CONCRETE (EXTERIOR WALLS)

A. High Quality Architectural Concrete: Quality of all exposed-to-view concrete and all concrete surfaces to receive waterproofing is of primary importance. Quality of all exposed-to-view concrete is to be consistent in appearance and is to have no less than the following characteristics:
   1. Proper and consistent alignment of form panels and form ties.
   2. Absence of staining from form leakage.
   3. Absence of honeycomb or excessive segregation due to improper vibration or form leakage.
   4. Correct placement of rustication or other detail treatment as shown on drawings.
   5. Truly square and plumb corners unless clearly directed otherwise.
   6. Absence of markings from formwork (i.e. use MDF or plastic forms.)
   7. Surfaces to receive waterproofing or thru-wall flashings are free of coatings, form release agents, sealers, curing agents, treatments, and similar materials, unless written prior approval of the products used is obtained from the specified waterproofing or thru-wall flashing manufacturer.

2.04 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. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

D. Plain-Steel Wire: ASTM A 82, as drawn.

2.05 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. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

D. 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. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.06 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, gray.

B. Test aggregate for the mix for expansion in accordance with AASHTO T 303.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S 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: 3/4 inch nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

3. For exposed surfaces, and surfaces receiving EIFS skim coats, do not use fine or coarse aggregates which may cause stains on concrete surfaces or that contain substances that cause spalling.
4. Do not use aggregates containing soluble salts or other substances such as iron sulphides, pyrite, marcasite, or ochre which can cause stains on concrete surfaces.

D. Lightweight Aggregate: ASTM C 330, 3/4-inch nominal maximum aggregate size.

E. Water: ASTM C 94/C 94M and potable.

2.07 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. Water-Reducing Accelerating Admixture: ASTM C 494/C 494M, Type E.
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. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
1. Products:
a. Boral Material Technologies, Inc.; Boral BCN.
b. Euclid Chemical Company (The); Eucon CIA.
c. Grace Construction Products, W. R. Grace & Co.; DCI.
d. Master Builders, Inc.; Rheocrete CNI.
e. Sika Corporation; Sika CNI.

D. Lithium Admixture: Lithium compound admixture that produces a concrete mix with a linear expansion at 14 days not exceeding 0.10 percent when tested in accordance with ASTM C 1567. Lithium Admixture shall be used on an as-needed basis in order to mitigate alkali silika reactivity and to meed the strength requirements of paragraph 2.13 of this Section. Alkali silica reactivity will be basis for concrete work rejection.

2.08 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Products:
a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
b. Euclid Chemical Company (The); Eucobar.
c. L&M Construction Chemicals, Inc.; E-Con.
d. MBT Protection and Repair, Div. of ChemRex; Confihn.
e. Metalcrete Industries; Waterhold.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A, moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
1. Products:
a. Anti-Hydro International, Inc.; A-H 3 Way Sealer.
b. Burke by Edoco; Spartan-Cote.
c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Conspec #1.

d. Euclid Chemical Company (The); Eucocure.
e. L&M Construction Chemicals, Inc.; L&M Cure R.
f. MBT Protection and Repair, Div. of ChemRex; Masterkure.
g. W.R. Meadows, Inc.; CS-309.
h. Metalcrete Industries; Seal N Kure.
i. Sonneborn, Div. ofChemRex; Kure-N-Seal

2.09 SEALING MATERIALS

A. Concrete slab sealer manufactured for cured, dry concrete.

B. Products:
1. Sikagard 701W, by Sika Corporation or pre-bid approved equal.

2.10 RELATED OR ACCESSORY MATERIALS

A. Slab edge expansion joints: Polyfoam # PF-H50, 6 inch x 1/2" with a pre-scored, removable top piece for slab to wall sealant application. Product by Superior Profiles or equal.

B. Cold or Construction Joints: Keyway # 21-KW- 10, re-usable polyethylene keyway strip. Product by Superior Profiles or equal.

C. Control Joints: Zipstrip # 21-1 1/2 x 10, rigid polystyrene "T" shaped strip for forming straight control joints from wall to wall. After initial set, remove horizontal portion of the "T" and tool edges for sealant application. Product by Superior Profiles or equal.

D. For uses not otherwise indicated: Expansion- and Isolation-Joint-Filler Strips: ASTM 0 1 75 1 , asphalt-saturated cellulosic fiber. Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations as indicated.

E. Backer Rod: Closed Cell Backer Rod to for a non-absorbent compressible backup for sealant joint backup. Sizes 1/4" to 4" as required. Product by Superior Profiles or equal.

F. Bonding Agent: ASTM C I 059, Type II, non-redispersable, acrylic emulsion or styrene butadiene.

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

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C !50, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 2 19.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4 1 00 psi at 28 days when tested according to ASTM C 109/C 109M.

2.12 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. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
2. Do not use the same testing agency for field quality control testing.

B. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

C. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing, high-range water-reducing, or plasticizing 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 required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
   4. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F.
   5. Use high-range water-reducing admixture in pumped concrete, architectural concrete, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
   6. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
      a. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure: 6.0 percent for 3/4-inch maximum aggregate.
      b. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 3 percent air.
      c. Use lithium compound admixture to produces concrete mix with linear expansion at 14 days not exceeding 0 . 1 0 percent when tested in accordance with ASTM C 1567.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when warranted by characteristics of materials, job conditions, weather, test results, or other circumstances. Submit laboratory test data for revised mix design and strength results to Architect and obtain Architect's acceptance before using in Work.
   1. Laboratory Trial Batches: When laboratory trial batches are used to select concrete proportions, prepare test specimens as specified in ACI 301 and in accordance with ASTM C 192 and conduct strength tests in accordance with ASTM C 39.
   2. . Field Experience Method: When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301.
   3. If suitable data from field experience or laboratory trial batches cannot be obtained, concrete proportions may be established by use of the water-cement ratio limits table and the limiting restrictions of ACI 301.
   4. Strength data for establishing standard deviation will be considered suitable if the concrete production facility has certified records consisting of at least 30 consecutive tests in one group or the statistical average for 2 groups totaling 30 or more tests, representing similar materials and project conditions.
   5. Standard Deviation: If standard deviation exceeds 600 psi or if no suitable records are available, select proportions to produce an average strength of at least 1200 psi greater than the required compressive strength of concrete.
   6. After sufficient experience and test data become available from the job, using ACJ 2 1 4 methods of evaluation, the standard deviation may be reduced when the probable frequency of tests more than 500 psi below required compressive strength will not exceed 1 in 100, and that the probable frequency of an average of 3 consecutive tests below required compressive strength will not exceed 1 in 100.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. General: Submit written reports to Architect of each proposed mix for each class of concrete at least 1 5 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

B. Footings: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: **4000 psi at 28 days.**
   2. Maximum Water-Cementitious Materials Ratio: 0.45.
   3. Slump Limit: 4 inches or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

C. Walls, Foundations Walls, and Planter Walls: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: **4000 psi at 2 8 days.**
   2. Maximum Water-Cementitious Materials Ratio: 0.45.
   3. Slump Limit: 4 inches or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

D. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: **4500 psi at 28 days.**
   2. Minimum Cementitious Materials Content: 6 1 1 lb/cu. yd.
   3. Slump Limit: 4 inches, maximum.
   4. Air Content: 6 percent, plus or minus 1 .5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
   5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

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

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1 - 1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
   2. Include at least the following information on each batch ticket:
      a. Name of ready-mix batch plant.
      b. Serial number of ticket.
      c. Date and number of truck.
      d. Name of Contractor.
      e. Specific designation of job (name and location).
      f. Volume of concrete (number of cubic yards).
      g. Time batch was dispensed to truck.
      h. Reading of revolution counter at first addition of water.
      i. Signature or initials of ready-mix representative.
      j. Type and brand of cement.
      k. Amount of cement (can be indicated by weight or quantity).
      l. Total water content by producer (can be indicated by weight or quantity).
      m. Water added by receiver of concrete and his initials (can be indicated by weight or quantity).
      n. Admixtures and amount of same.
      o. Maximum size of aggregate.
      p. Weights of fine and coarse aggregates.
      q. Indication that all ingredients are as previously certified or approved.

PART 3 – EXECUTION

3.01 COORDINATION

A. Coordinate the installation of joint materials and other related materials with placement of forms and reinforcing steel.

3.02 PREPARATION

A. Ensure that all silt, loose rock, and deleterious material has been removed from the building area prior to concrete pouring. Evaluate site prior to bidding to determine if any additional topsoil removal may be required. Do not use this material as fill.
   1. Bear all footings on approved sound bedrock or approved lean mix concrete.

3.03 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. Use camber in the formwork as required for anticipated deflections.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Use selected materials to obtain required finishes.
   1. Provide surveys in addition to those required for general lines and levels to check the lines and levels of completed formwork for exposed work before concrete is placed.

D. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces and high quality architectural surfaces including surfaces exposed to view and surfaces to receive waterproofing, carpeting, or vinyl tiling. Comply with ACI 303.1 limits on form-facing panel deflection.
   2. Class B, 1/4 inch for rough-formed finished surfaces.

E. Construct forms tight enough to prevent loss of concrete mortar.

F. 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, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.
   3. Coat steel forms with a nonstaining, rust-preventative material.

G. 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.

H. 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.

I. At construction joints, overlap forms over hardened concrete at least 6 inches.

J. Chamfer exterior corners and edges of permanently exposed concrete.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items. Accurately place and securely support items built into forms.

L. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

M. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

N. Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-release agent, according to manufacturer's written instructions, before placing reinforcement.
   1. Form coatings: Coat forms prior to placement of reinforcing steel. Do not allow excess form coating material to accumulate in forms or come into contact with surfaces which will be bonded to fresh concrete. Apply according to manufacturer's instructions.

O. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.04 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. Install dovetail anchor slots in concrete structures as indicated.
   4. Place all sleeves, inserts, anchors and embedded items required for adjoining work, or for its support, prior to concreting.

3.05 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 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 100 percent of its 28-day design compressive strength or for 28 days, whichever is longer.
      a. Determining numbers of cylinders, testing dates, and costs associated with field cured cylinders.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores. Do not remove form-facing material less than 4 days after placement.

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.

3.06 SHORES AND RESHORES

A. Comply with ACI 318 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. Where concrete construction extends to more than one floor level, extend shoring or reshoring over both 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.

D. Keep reshores in place a minimum of 28 days after placing upper tier, or longer, if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.07 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not tack weld reinforcing bars.
   2. Do not bend reinforcing steel after embedding in hardened concrete, unless authorized by Owner.
   3. In the case of fabricating errors, do not rebend or straighten reinforcing steel.
   4. Locate reinforcing splices at points of minimum stress.
   5. Reinforcement with any of the following defects will not be permitted in the work:
      a. Bar lengths, depths, and bends exceeding specified fabrication limits.
      b. Bends or kinks not indicated on drawings or final shop drawings.
      c. Bars with reduced cross-section due to excessive rusting or other cause.

B. 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.

D. Secure reinforcement bars with wire ties at all points of intersection unless the spacing is less than 12 inches in each direction, in which case tie alternate points of intersection Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.08 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 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. Repeat grooving of contraction joints after applying surface finishes. Eliminate groove 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- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays). Show on shop drawings for architect's approval.
4. Joint fillers and sealants are specified in Section 321373 "Joint Sealants."
5. Joint fillers and sealants for building applications are specified in Section 079005 "joint Sealants."

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 321373 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. 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.

3.09 CONCRETE PLACEMENT

A. If concrete of a concrete delivery truck is rejected for any reason, do not allow truck on-site for a minimum of 12 hours after moment of rejection.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed. Notify other trades to permit installation of their work.

C. Preparation of Subgrade for Slabs on Grade: Keep subgrade moist but do not allow standing water, mud or soft spots. If temperature where concrete is to be placed is below 50EF, enclose and heat to maintain temperature above 50EF long enough to remove frost from subgrade.

D. Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

E. Do not allow time between charging of materials in the mixing drum and placement on site to exceed 90 minutes (60 minutes for air-entrained concrete), less for higher temperatures.

F. Use conveying equipment that conforms to ASTM C 94.

G. Handle concrete from mixer to place of final deposit as rapidly as practicable.

H. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 and the following. Account for all water added to the concrete mix.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
2. Do not add any water to ready-mix concrete drum unless the following conditions are satisfied:
   a. Water is added only while the concrete is mixing in the drum.
   b. Mixing truck is equipped with a revolution counter and a working water meter.
   c. Delivery ticket provides all information required in this Section so that the total amount of water added to the mix can be determined.
   d. Provide slurry test and compression tests for all concrete after water is added at site.

I. Bear footings 6 inches into sound bedrock. Dowel continuous and spot footings, columns and piers into bedrock using Super Por-Rock with reinforcing as directed by Structural Engineer.
1. Lean-Mix Concrete Fill: Bear footings on bedrock as defined above or on lean-mix concrete fill, which bears 6 inches into bedrock. Lean-mix concrete may be placed across the clean base of the footing excavations for a leveling course.

J. 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 no deeper than 24 inches and 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. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively.
   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 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.
   4. If a section cannot be placed continuously, locate construction joints as approved a maximum of 30 foot on center.
   5. Do not allow concrete to free fall over 4 feet.
   6. Deposit concrete as near as possible to its final position to avoid segregation due to rehandling or flowing.
   7. Clean and dampen hardened concrete surfaces to receive fresh concrete.

K. 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, 1/8-inch per foot minimum, 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.

L. 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 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, or on frozen concrete surfaces.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

M. Hot-Weather Placement: Comply with ACI 301 and as follows:
   1. Maintain concrete temperature below 90 deg F 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.

3.10 FINISHING FORMED SURFACES

A. Exposed to view (interior or exterior) Vertical Concrete: 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. Provide rubbed finish as exposed to view vertical concrete surfaces to achieve a uniform texture.
   2. Provide a sample wall area on the first building constructed that can be reviewed, adjusted and approved for use as a standard for subsequent buildings on the site.
   3. Exposed surfaces to be sealed with water repellent are specified in Section 071920.
   4. Exposed surfaces to be waterproofed with a fluid-applied product are specified in Section 071420.

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 or to be covered with a coating or covering material applied directly to concrete such as waterproofing, painting, or another similar system.

C. 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.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and straighten until surface is free of trowel marks and uniform in texture and appearance. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces to be covered with fluid-applied waterproofing.
   2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked surface:
      a. Specified overall values of flatness, F(F) 20; and of levelness, F

C. Grooved Surface Pattern: See drawings for areas of grooving for animals and for definition of the tooling regime required.

D. 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.

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 hotweather 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 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, 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:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   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, 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.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
   3. Begin curing operations immediately after placement. Protect concrete from premature drying, excessively hot or cold temperatures, mechanical injury or vandalism.

F. Stain Prevention: Use special care to prevent petroleum and other stains from forming on concrete surfaces. Comply with at least the following:
   1. Diaper all hydraulic powered equipment to avoid staining of concrete.
   2. Do not allow vehicles to park on the interior slabs if avoidable. If vehicles are necessary to complete scope of work, place drop cloths below vehicles at all times.
   3. Do not use pipe cutting machines on interior floor slabs.
   4. Avoid rust staining. Do not allow steel to be placed on interior slab.

3.13 CONCRETE SEALING

A. Scope: All concrete slabs under roof covering, interior of buildings or those exposed to animal waste shall be sealed after concrete is cured.

B. Follow manufacturers instructions.

C. Apply sealant to dry and clean surface prior to allowing any soiling or traffic on the surface.

D. Apply a sandblast or high pressure water wash or other mechanical means to remove any glaze or soiling of the surface.

E. Apply sealant by brush, roller or spray to a coverage stipulated in manufacturers literature.

F. Protect applied material for at least 72 hours.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least six months unless otherwise approved by Architect to meet schedule requirements. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 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 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. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/4 inch in any dimension , and holes left by tie rods and bolts down to solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Thoroughly 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. Place patching mortar before bonding agent has dried. No featheredge will be permitted.
   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. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as slabs, for finish smoothness 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, pop outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch 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 proprietary repair underlayment when acceptable to Architect. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.Repair defective areas, except random cracks and single holes 1 inch 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 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.
   5. Repair random cracks and single holes 1 inch 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.

G. Where parging may be required, alignment, color and texture must match adjacent concrete and be approved by the Architect.

H. Architectural Concrete: Use special care repairing concrete exposed to view. Comply with the following:
   1. Protect corners, edges, and surfaces of architectural concrete from damage; use guards and barricades.
   2. Protect architectural concrete from staining, laitance, and contamination during remainder of construction period.
   3. Clean architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
   4. Wash and rinse architectural concrete surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.
   5. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Steel reinforcement placement.
   2. Verification of use of required design mixture.
   3. Concrete placement, including conveying and depositing.
   4. Curing procedures and maintenance of curing temperature.

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 1 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   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. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   6. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
      b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. 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.
10. 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.
11. 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.
12. 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.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate does not comply.

D. Measure slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete Block for exterior and interior walls.

B. Mortar and grout.

C. Reinforcement and anchorage.

D. Loose steel lintels.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

B. Section 07 9005 - Joint Sealers: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2008.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

D. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.

E. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2019.

F. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2014.

G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

H. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

I. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2016.

J. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

K. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

L. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

M. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

N. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

O. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. Load-Bearing Units: ASTM C90, medium weight.
      a. Hollow block, as indicated.
      b. Type I - Moisture-controlled; medium weight.
      c. Exposed Faces: Manufacturer's standard color and texture where indicated.

2.02 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.
   1. Color: Natural Gray to match existing.

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Not more than 0.60 percent alkali.
   2. Hydrated Lime: ASTM C207, Type S.
   3. Mortar Aggregate: ASTM C144.
   4. Grout Aggregate: ASTM C404.

C. Water: Clean and potable.

D. Accelerating Admixture: Nonchloride type for use in cold weather.

E. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. AA Wire Products, L.L.C.
   2. Dur-O-Wal: www.dur-o-wal.com.
   3. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
   4. WIRE-BONDwww.wirebond.com/#sle.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) deformed billet bars; uncoated, sized as indicated on the drawings.

C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

D. Ties for Brick Veneer over Concrete Masonry Units - Equal to HB-5213.
   1. Veneer Anchors at 24" vertically & 16" horizontal.

2. Bracket Leg Length 2 inches.

2.04 LINTELS

A. Steel angles as shown in the drawings, furnished by Section 05 5000.

2.05 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Exterior, loadbearing masonry: Type S.
   2. Exterior, non-loadbearing masonry: Type S.
   3. Interior, loadbearing masonry: Type S.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

F. Interlock intersections and external corners.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Fasten anchors to structural framing or embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.07 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 16 inches on center.

B. Masonry Back-Up: Embed anchors to bond veneer at maximum 24 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.08 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.09 CONTROL AND EXPANSION JOINTS

A. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

B. Size control joints as indicated on drawings; if not indicated, match width of grout joint.

3.10 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and window frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.11 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.12 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67/C67M requirements, sampling 5 randomly chosen units for each 50,000 installed.

C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

D. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.13 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.14 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formed steel stud exterior wall and interior wall framing.

B. Water-resistive barrier over sheathing.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Roof and wall sheathing.

B. Section 07 2500 - Weather Barriers: Weather barrier over sheathing.

C. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

D. Section 07 9005 - Joint Sealers.

1.03 REFERENCE STANDARDS

A. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data; 2017.

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).

E. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.

F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.

C. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention, and _____.

PART 2 PRODUCTS

2.01 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.02 FRAMING MATERIALS

A. Wall Studs and Track Sections: AISI S240; c-shaped studs and u-shaped track sections in stud-matching nominal width and compatible height.

B. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
   1. Design Uncoated - Steel Thickness: 0.0474 inches (1.20 mm)

2. Flange Width: 1 5/8" inches (41mm)

C. Jamb Studs: Engineered, C-shaped with wide flanges, designed to replace conventional double-stud framing at openings.
   1. Design Uncoated - Steel Thickness: 0.0474 inches (1.20 mm)
   2. Flange Width: 1 5/8" inches (41mm)

2.03 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Anchorage Devices: Powder actuated.

2.04 WALL SHEATHING

A. Wall Sheathing: See Section 06 1000.

2.05 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

C. Water-Resistive Barrier: As specified in Section 07 2500.

2.06 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Anchorage Devices: Powder actuated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION - GENERAL

A. Install structural members and connections in compliance with ASTM C1007.

3.03 INSTALLATION OF STUDS

A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.

B. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.

C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

D. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

E. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

3.04 INSTALLATION OF WALL SHEATHING

A. Install wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.
   1. Provide plywood wall sheathing at least 32 inches wide at building corners, measured horizontally.
   2. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges, and ends.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.06 TOLERANCES

A. Studs - Vertical Alignment (Plumbness): 1/960 of span, or 1/8 inch in 10 ft, in accordance with ASTM C1007.

B. Studs - Maximum Variation from True Position: 1/8 inch in accordance with ASTM C1007.

C. Stud Spacing: 1/8 inch from the designated spacing, provided that the cumulative error does not exceed the requirements of the finishing materials in accordance with ASTM C1007.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and miscellaneous metal items.
   1. Other Misc Steel fabrications shown or implied in drawings.

B. Pipe bollards

1.02 RELATED REQUIREMENTS

A. Section 03 3020 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 09 9000 - Paintings and Coating: Exterior Painting.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

I. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

J. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2014.

K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

N. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2008.

O. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.

P. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

Q. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

R. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified steel fabricator with AWS certified welders and minimum 5 years experience in steel fabrication.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

B. Final Painting to be accomplished on site by Section 09 9000.

C. Thresholds below Overhead Doors: Galvanized pipe cast into concrete floor.

D. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish.

2.04 FINISHES - STEEL

A. Prepare surfaces to be primed in accordance with SSPC-SP2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Prime Painting: One coat.

D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior lumber framing.

B. The General Contractor shall be responsible for all work shown or implied on the drawings and Spec Section 061000, Rough Carpentry.
   1. Installation of Division 10 specialties.
   2. Installation of doors and hardware.
   3. Concealed wood blocking for support of all accessories, handrails, grab bars & fire extinguishers and other wall hung supported extinguishers.
   4. Air Infiltration Provisions: This section shall accomplish the following sealing to prevent air infiltration.
      a. Rubber membrane seal at plumbing vents through wall plates into attic.
   5. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 06 6500 - Solid Polymer Fabrications.

B. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2009.

B. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

E. PS 1 - Structural Plywood; 2009.

F. PS 20 - American Softwood Lumber Standard; 2010.

G. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.

H. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.

1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
2. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER

A. Grading Agency: Western Wood Products Association; WWPA G-5.

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Blocking, Furring, and Nailers:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Wall Sheathing: APA PRP-108, Structural I Rated Sheathing, Exterior Exposure Class, and as follows:
   1. Thickness: 23/32" (3/4").
   2. Span Rating: 32/16.
   3. Thickness: 3/4 inch, nominal.

B. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
   3. Other Locations: PS 1, C-D Plugged or better.
   4. Electrical Component Mounting: APA rated sheathing, fire retardant treated.

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

C. Seismic Hold Down anchors and Hurricane framing anchors by Simpson or approved equal.

D. Water-Resistive Barrier: As specified in Section 07 2500.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
   1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   2. Treat lumber in contact with masonry or concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

D. Coordinate Wood Window unit sizes prior to framing exterior walls.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. White boards.
   8. Wall paneling and trim.

9. Joints of rigid wall coverings that occur between studs.
10. Video monitors and Smart boards.
11. Patient Headwall Units.
12. Medical Equipment Supports.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Deck Sheathing: Secure with long dimension perpendicular to joists, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Note requirements on drawings for sheathing to span continuous sheathing to parapet wall shall extend from the top of wall to well below the bearing plates.

3.06 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.07 CLEANING

A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Countertops where shown as Plastic Laminate.

C. Hardware.

D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

D. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

F. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.

G. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

H. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

I. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

J. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/certification.

K. WI (MCP) - Monitored Compliance Program (MCP); current edition at www.woodworkinstitute.com/certification.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification:
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Johnson Brothers Mill, Idaho Falls, Idaho.

B. Granite Mill, Salt Lake City, Utah.

C. Approved Equal.

D. Substitutions: See Section 01 6000 - Product Requirements.

E. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 DESCRIPTION

A. Typical Countertops: Typically Plastic Laminate. See Finish Schedule for Manuf. & Color.
   1. Back Splash: 3/4" Rectangular PLam.
   2. Countertop Front Edge: 3mm PVC edgebanding

B. Plastic Laminate faced base, upper cabinets and shelf units as shown on drawings.

2.03 CABINETS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Finishes:
   1. Finish - Exposed Exterior Surfaces: Exposed surfaces of cabinets shall include the exterior of door and drawer fronts, exposed cabinet ends and backs, tops of cabinets under 72" above the floor.
      a. Exposed surfaces shall be finished with high pressure decorative laminate GP28 and selected from the manufacturer's premium proced solid colors and patterns. Color as selected by architect.
   2. Finish - Semi-Exposed Surfaces: Semi-exposed portions of cabinets shall include interior components of all cabinets such as ends, backs, bottoms, shelves, partitions, drawer sides, drawer backs, drawer bottoms, and other similar members exposed to view. UNder side of wall cabinets and tops 72" above the floor shall be considered semi-exposed
      a. All semi-exposed surfaces to be finished in light gray color melamine or polyester low pressure laminate meeting ALA 1988.
   3. Finish - Concealed Surfaces: Concealed portions include those surfaces not exposed to view upon completion of installation such as unfinished outside ends, rear of backs, underside of bottoms under 30" above floor, tops of cabinets over 72" unless seen from above .

4. Exterior Edges: Include doors, drawer fronts, and font edge of vertical end panels and leg panels. Exterior edges are to be edged with 3mm PVC edgebanding. Color as selected by architect.
5. Body Edges: Shall include the front edge of the top and bottom of cabinet boxes, which shall be provided with 3mm PVC edge banding in color matching the exterior edges.
6. Interior Edges: Shall include all visible edges of cabinet interior components such as front edge of shelves, partitions, and top edges of drawer boxes, whcih shall be edges with 3mm PVC edge banding in color matching selected semi-exposed interior surfaces.

2.04 LAMINATE MATERIALS

A. Manufacturers:
1. Formica Corporation: www.formica.com/#sle.
2. Wilsonart LLC: www.wilsonart.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as indicated.
1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, finish as indicated.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, finish as indicated.
3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, finish as indicated.
4. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, finish as indicated.

2.05 COUNTERTOPS

A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.

2.06 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Plastic Edge Banding: 3mm PVC, _____; smooth
1. Color: As selected by JHS Architects from manufacturer's standard range.

C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

E. Concealed Joint Fasteners: Threaded steel.

F. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.07 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.

C. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
1. Materials: Steel; T-shape cross-section.
a. Finish: Manufacturer's standard, factory-applied, powder coat.
b. Color: Black.
c. Height: 9 inches.
d. Support Length: 9 inches.
e. Width: 1 inch.

D. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.

E. Sliding Door Pulls: Circular shape for recessed installation, steel with satin finish.

F. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.

G. Catches: Magnetic.

H. Drawer Slides:
   1. Type: Full extension.
   2. Static Load Capacity: Commercial grade.
   3. Mounting: Side mounted.
   4. Stops: Integral type.
   5. Features: Provide self closing/stay closed type.
   6. Manufacturers:
      a. Accuride International, Inc; Light-Duty Drawer Slides: www.accuride.com/#sle.
      b. Grass America Inc: www.grassusa.com.
      c. Knape & Vogt Manufacturing Company; Light-Duty Drawer Slides: www.knapeandvogt.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

I. Hinges: European style concealed self-closing type, steel with polished finish.
   1. Manufacturers:
      a. Grass America Inc; Tiomos Hinge System: www.grassusa.com/#sle.
      b. Hardware Resources: www.hardwareresources.com/#sle.
      c. Blum, Inc: www.blum.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.08 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

E. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.

F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic batt insulation in walls and ceilings.

B. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, and exterior wall behind _____ wall finish where shown.

C. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.

B. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2006.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

B. Insulation at Exterior Walls: Expanded polystyrene (EPS) board.

C. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

A. Expanded Polystyrene (EPS) Board Insulation: Complies with ASTM C578.
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   3. Board Size: 48 inch by 96 inch.
   4. Board Thickness: 1-1/2 inch.
   5. Board Edges: Square.
   6. Water-Resistive Barrier: Integrated film facer on insulation.
   7. Type and Compressive Resistance: Type XI, 5 psi (35 kPa), minimum.

8. Type and Water Absorption: Type XI, 4.0 percent by volume, maximum, by total immersion.
9. Compressive Resistance: 5 psi.
10. Manufacturers:
    a. Atlas Molded Products, a Division of Atlas Roofing Corporation; ThermalStar EPS Laminated Wall Insulation (LWI): www.atlasmoldedproducts.com/#sle.
    b. Diversifoam Products; _____: www.diversifoam.com/#sle.
    c. Grace Construction Products: www.na.graceconstruction.com.
    d. Substitutions: See Section 01 6000 - Product Requirements.

B. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
2. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
5. Board Size: 24 x 96 inch.
6. Board Thickness: 2 inches.
7. Board Edges: Square.
8. Thermal Conductivity (k factor) at 25 degrees F: 0.18.
9. Compressive Resistance: 15 psi.
10. Board Density: 1.3 lb/cu ft.
11. Water Absorption, maximum: 0.3 percent, volume.
12. Manufacturer: Dow or Fomular or Equal.

2.03 BATT INSULATION MATERIALS

A. Batt Insulation: ASTM C 665; preformed mineral fiber acoustic batt; conforming to the following:
1. Locations: Where shown
    a. Exterior Walls @ 2x8 Studs.
2. Thermal Resistance: R of 13.
3. Thickness: 3.5 inch.
4. Width: 16" nominal.
5. Facing: Unfaced.
6. Manufacturers:
    a. CertainTeed Corporation: www.certainteed.com.
    b. Johns Manville International, Inc: www.johnsmanville.com.
    c. Owens Corning Corp: www.owenscorning.com.
7. Substitutions: See Section 01600 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards horizontally on walls.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted. (2 feet in from perimeter as detailed. This requirement is for exterior perimeter of the office building only.)

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.04 BATT INSTALLATION

A. Install insulation, in accordance with manufacturer's instructions.

B. Provide two rows of stick pin fasteners in each cavity at 24 inches on center or less to prevent sag.

C. Impale insulation batts over stick pins.

D. Install without gaps or voids. Do not compress insulation.

E. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

F. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.05 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 2400
EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Composite wall cladding of rigid insulation and reinforced finish coating ("Class PB").

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Masonry & existing Wood stud wall.: Masonry substrate and existing wood sheathing..

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

B. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2015a.

C. ASTM C1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage; 2013.

D. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2015.

E. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity; 2015.

F. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

H. ASTM E2486/E2486M - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS); 2013.

I. ICC-ES AC219 - Acceptance Criteria for Exterior Insulation and Finish Systems; 2009, with Editorial Revision (2014).

J. NFPA 259 - Standard Test Method for Potential Heat of Building Materials; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.

C. Shop Drawings: Indicate wall joint patterns, joint details, and molding profiles.

D. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.

E. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.

F. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements. Include cleaning instructions for existing EIFS surfaces indicated to receive new finish coat.

1.05 QUALITY ASSURANCE

A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.

B. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
   1. Member in good standing of EIMA (EIFS Industry Members Association).
   2. Manufacturer of EIFS products for not less than 5 years.

C. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.

B. Storage: Store materials as directed by manufacturer's written instructions.
   1. Protect adhesives and finish materials from freezing, temperatures below 40 degrees F and temperatures in excess of 90 degrees F.
   2. Protect insulation materials from exposure to sunlight.

1.07 FIELD CONDITIONS

A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.

B. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.

C. Do not install coatings or sealants when ambient temperature is below 40 degrees F.

D. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's standard material warranty, covering a period of not less than 5 years.

C. Provide separate warranty from installer covering labor for repairs or replacement for a period of not less than 5 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Dryvit Systems, Inc; Dryvit Outsulation X Exterior Insulation and Finish System, Class PB with Moisture Drainage; www.dryvit.com/#sle.

B. Other Acceptable Manufacturers:
   1. BASF Wall Systems (Senergy, Finestone, Acrocrete, SonoWall): www.wallsystems.basf.com.
   2. Master Wall, Inc; Aggreflex System: www.masterwall.com/#sle.
   3. Sto Corp: www.stocorp.com/#sle.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

A. Exterior Insulation and Finish System: BARRIER type; reinforced finish coating on insulation board adhesive-applied direct to substrate; provide a complete system that has been tested to show compliance with the following characteristics; include all components of specified system and substrate in tested samples.

B. Fire Characteristics:
   1. Flammability: Pass, when tested in accordance with NFPA 285.
   2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.

3. Potential Heat of Foam Plastic Insulation Tested Independently of Assembly: No portion of the assembly having potential heat that exceeds that of the insulation sample tested for flammability (above), when tested in accordance with NFPA 259 with results expressed in Btu per square foot.

C. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.

D. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.

E. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycles 1, 5, or 9.

F. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.

G. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.

H. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

I. Impact Resistance: Construct system to provide the following impact resistance without exposure of broken reinforcing mesh, when tested in accordance with ASTM E2486/E2486M:
   1. Standard: 25 to 49 in-lb, for areas not indicated as requiring higher impact resistance.
   2. High: 90 to 150 in-lb, for 10 feet i the wall from ground plane..

2.03 MATERIALS

A. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
   1. Texture: Dryvit Systems, Inc, Standard Textures, with Dirt Pickup Resistance; Quarzputz DPR; www.dryvit.com/#sle.
   2. Color: As selected by JHS Architects from manufacturer's standard range.

B. Base Coat: Fiber-reinforced, acrylic or polymer-based product compatible with insulation board and reinforcing mesh.

C. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.

D. Insulation Board: Molded expanded polystyrene (EPS) board insulation, 1, Type XI, with the following characteristics:
   1. Board Thickness: 1 inches.
   2. Thickness Tolerance: Plus/minus 1/16 inch maximum.
   3. Board Edges: Square.
   4. Thermal Resistance (R factor per 1 inch (25.4 mm)) at 75 degrees F: 3.60.
   5. Board Density: 0.9 lb/cu ft.
   6. Compressive Resistance: 10 psi.
   7. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, when tested in accordance with ASTM E84.

2.04 ACCESSORY MATERIALS

A. Insulation Adhesive: Type required by EIFS manufacturer for project substrate.

B. Trim: EIFS manufacturer's standard galvanized steel trim accessories, as required for a complete project and including starter track and drainage accessories.

C. Sealant Materials: Compatible with EIFS materials and as recommended by EIFS manufacturer.

PART 3 EXECUTION

3.01 GENERAL

A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.

B. Where different requirements appear in either document, comply with the most stringent.

C. Neither of these documents supercedes the provisions of the Contract Documents that define the contractual relationships between the parties or the scope of work.

3.02 EXAMINATION

A. Verify that substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.

B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

3.03 PREPARATION

A. Install self-furring metal lath over solid substrates that are deemed unacceptable to receive adhesively applied insulation. Install in accordance with ASTM C1063, except for butt-lapping instead of overlapping.
   1. Attach to concrete and concrete masonry using corrosion-resistant power or powder actuated fasteners or hardened concrete stub nails not less than 3/4 inch long and with heads not less than 3/8 inch wide. Ensure that fasteners are securely attached to substrate and spaced at maximum 16 inches on center horizontally and 7 inches vertically.

B. Apply primer to substrate as recommended by EIFS manufacturer for project conditions.

3.04 INSTALLATION - GENERAL

A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
   1. Where different requirements appear in either document, comply with the most stringent.
   2. Neither of these documents supercedes provisions of Contract Documents that defines contractual relationships between parties or scope of this work.

3.05 INSTALLATION - INSULATION

A. Install in accordance with manufacturer's instructions.

B. Prior to installation of boards, install starter track and other trim level and plumb and securely fastened. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.

C. Install back wrap reinforcing mesh at all openings and terminations that are not to be protected with trim.

D. On wall surfaces, install boards horizontally.

E. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.

F. Fill gaps greater than 1/16 inch with strips or shims cut from the same insulation material.

G. Rasp irregularities off surface of installed insulation board.

H. Mechanical Fastening: Space fasteners as recommended by EIFS manufacturer.

I. Adhesive Attachment: Use method recommended by EIFS manufacturer.

3.06 INSTALLATION - CLASS PB FINISH

A. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at terminations of EIFS. Install reinforcing fabric as recommended by EIFS manufacturer.
   1. Lap reinforcing mesh edges and ends a minimum of 2-1/2 inches.
   2. Allow base coat to dry a minimum of 24 hours before next coating application.

B. Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.

C. Apply finish coat over existing cleaned EIFS surfaces. Clean and prep existing surfaces per manufacturers recommendations.

D. Finish Coat Thickness: 1/16 inch.

E. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.

3.07 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

3.08 PROTECTION

A. Protect completed work from damage and soiling by subsequent work.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING, TRIM & ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts except flashings furnished with Pre-Engineered Metal Buildings..

B. Sheet Metal Parapet Cap

C. Miscellaneous flashings shown.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

D. ASTM B101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction; 2012.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual and CDA Copper in Architecture Handbook requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.

2.02 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Primer: Zinc chromate type.

C. Protective Backing Paint: Zinc molybdate alkyd.

D. Sealant: Types 2, 3, or 4 specified in Section 079005, depending on application.

E. Plastic Cement: ASTM D4586, Type I.

F. Solder: ASTM B32; Sn50 (50/50) type.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.04 GUTTER AND DOWNSPOUT FABRICATION

A. Downspouts: Round profile as detailed.

B. Gutters and Downspouts: Size indicated and as detailed.

C. Accessories: Profiled to suit gutters and downspouts.
   1. Anchorage Devices: In accordance with SMACNA requirements.
   2. Gutter Supports: Brackets.
   3. Downspout Supports: Brackets.

D. Downspout Boots: Steel.

E. Seal metal joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Conform to drawing details.

B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

F. Secure gutters and downspouts in place using concealed fasteners.

G. Slope gutters 1/4 inch per 10 feet, minimum.

H. Connect downspouts to downspout boots. Grout connection watertight.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

A. Section 08 8000 - Glazing: Glazing sealants and accessories.

B. Section 08 4313 - Aluminum Framed Storefronts.

C. Section 09 2116 - Gypsum Board Assemblies: Acoustic sealant.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2014.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Silicone Sealant: Mildew Resistant
   1. Bostik Inc: www.bostik-us.com.
   2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
   3. Pecora Corporation; 890NST Ultra Low Modulus Architectural Silicone Sealant - Class 100: www.pecora.com.
   4. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   5. Red Devil; 100% Silicone Industrial Grade RTV Sealant: www.reddevil.com.
   6. Tremco Global Sealants: www.tremcosealants.com.

B. Acrylic Sealants (ASTM C920):
   1. Tremco Global Sealants: www.tremcosealants.com.
   2. Red Devil; Siliconized Acrylic Construction Grade (35 Year) Sealant: www.reddevil.com.
   3. Sherwin-Williams Company; Shermax Urethanized Elastomeric Sealant: www.sherwin-williams.com.

C. Preformed Compressible Foam Sealers:
   1. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
   2. Sandell Manufacturing Company, Inc: www.sandellmfg.com/#sle.
   3. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
   4. Tremco Global Sealants: www.tremcosealants.com/#sle.

2.02 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single component.
   1. Color: To be selected by JHS Architects from manufacturer's standard range.
   2. Applications: Use for:
      a. Control, expansion, and soft joints in masonry.
      b. Joints between concrete and other materials.
      c. Joints between metal frames and other materials.
      d. Other exterior joints for which no other sealant is indicated.

C. Type 3 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: To be selected by JHS Architects from manufacturer's standard range.
   2. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

D. Type 4 - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
   1. Applications: Use for:
      a. Joints between plumbing fixtures and floor and wall surfaces.
      b. Joints between kitchen and bath countertops and wall surfaces.

2.03 ACCESSORIES

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

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

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

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

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
   1. Width/depth ratio of 2:1.
   2. Neck dimension no greater than 1/3 of the joint width.
   3. Surface bond area on each side not less than 75 percent of joint width.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

3.06 SCHEDULE

A. Exterior Joints for Which No Other Sealant Type is Indicated: Type 1; colors as shown on drawings.

B. Joints Between Exterior Metal Frames and Adjacent Work (except masonry): Type 1.

C. Under Exterior Door Thresholds: Type 1.

D. Interior Joints for Which No Other Sealant is Indicated: Type 3 .

E. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type 4.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOOR FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire rated steel doors and frames for interior and exterior applications.

1.02 RELATED REQUIREMENTS

A. Section 08 7105 - Door Hardware - Do not Use.

B. Section 09 9000 - Painting and Coating.

1.03 REFERENCE STANDARDS

A. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

F. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.

G. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames; 2012.

H. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; 2013.

I. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.

J. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Any current member of the Steel Door Institute.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors :
   1. Based on NAAMM HMMA Custom Guidelines:
      a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
      b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
      c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
   2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   4. Door Face Sheets: Flush.
   5. Insulating Value: R-value of 6.0 min, when tested in accordance with ASTM C1363.
   6. Weatherstripping: Refer to Section 08 7100.

2.03 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. General:
   1. Comply with the requirements of grade specified for corresponding door.
      a. ANSI A250.8 Level 1 Doors: 16 gage frames.
   2. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

D. Exterior Door Frames: Knock-down type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Weatherstripping: Refer to Section 08 7100.

E. Transom Bars: Fixed, of profile same as jamb and head.

2.04 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Factory Finish: Complying with ANSI A 250.3, manufacturer's standard coating.
   1. Color: To be selected by JHS Architects from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Install door hardware as specified in Section 08 7100.

D. Touch up damaged factory finishes.

3.03 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

END OF SECTION

SECTION 08 1120

SITE ASSEMBLED PRE-FINISHED METAL DOOR FRAMES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work under this section shall include the furnishing of all items shown on the drawings and as specified, including but not limited to, the following:

B. 1. Knocked down, site assembled prefinished steel door frames

C. 2. Knocked down, site assembled sidelight, borrowed light, transom, and fullbound access door frames

D. 3. Knocked down, site assembled Double Egress frames

1.02 RELATED SECTIONS

A. Section 01 6000 - Product Requirements

B. Section 08 1113 – Hollow Metal Doors and Frames

C. Section 08 1416 - Wood Doors

D. Section 08 7100 - Hardware

E. Section 08 8000 - Glazing

1.03 REFERENCES

A. ASTM A653 – Standard for hot dipped galvanized steel material

B. UBC 7-2-97, UBC 7-4-97 Positive Pressure Fire Test Certification.

C. UL 10B Fire test of Door Assemblies and UL10C Standard for Positive Pressure Fire Tests of Door Assemblies

D. NFPA-101 - Life Safety Codes (Latest Edition)

E. ASTM D2197 - Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.

F. ASTM D2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

G. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

H. ASTM D3361 - Standard Practice for Unfiltered Open-Flame Carbon-Arc exposures of Paint and Related Coatings.

I. ASTM B117 – Standard test for salt spray testing

1.04 SUBMITTALS

A. Product Data: Indicate frame material, guage, configuration and finishes.

B. Shop Drawings: See section 08 06 00. Indicate frame elevations, details of frame anchorage, reinforcements required, rough opening requirements, location of hardware embosses, and finishes. Detail each floor of the building separately.

C. Samples: Submit standard frame samples, illustrating factory finished frame colors.

D. Manufacturer's Installation Instructions: Provide installation instructions for all products under this section.

E. Manufacturer's Certificate of Warranty: (See Section 01 78 36) Provide manufacturer’s standard warranty certificate stating material is warranted for a period of one year from date of building occupancy

1.05 QUALITY ASSURANCE

A. Quality Standards

1. 1. Material free from defects in material and according to project specifications for pre-engineered opening systems

2. 2. Proven durability of factory finishes allowing for bending and shaping of material after finish is applied

B. Installed Frame Assembly: Conform to NFPA 80
1. Use only installers familiar with installation of prefinished opening systems and applied casing frame installation

1.06 DELIVERY, STORAGE AND HANDLING

A. Accept frames on site in manufacturer's box packaging with identification labels intact. Inspect for damage.

B. Do not open individual boxes until installation is to begin.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Timely Industries, A Division of SDS Industries, Inc., 10241 Norris Avenue, Pacoima, CA, 91331-2292; Phone toll free: 800-247-6242; Fax: 818-492-3530. Web site: www.timelyframes.com.

B. Frames: Provide interior frames for project areas as shown on plans and door schedule.

C. Substitutions: Refer to Section 016000

2.02 FRAMES

A. Frame Material: Hot dipped galvanized steel, for interior frames in normal atmospheric exposures.

B. Frame Throat Opening: As shown on plan details to suit finished wall thickness.

C. Frame Profile - Unequal Rabbet profile, standard with manufacturer
1. 1. “C” Series, 1.2 mm (18 guage) thick

D. Side Light Frames: 1.2 mm (18 guage) Verify glass dimensions for fire rated sidelights and borrowed lights

2.03 CASINGS

A. 1. Provide aluminum casings formed to be applied to heat treated clips on frame face after frame is anchored to wall

B. 2. Aluminum with reveal - TA-23 with a 6 mm (1/4 inch) reveal with manufacturer’s standard TA-24 corner alignment clips

C. Frame Reinforcement and Accessories

D. Provide reinforcements shipped loose to project site for hardware application

E. 5. Provide hinge reinforcement (TA-11) of 14 guage steel pierced to create depth of thread for hinge screws equal to or exceeding 10 gauge steel.
1. 6. Provide cut-outs and reinforcement for mortised hardware –
2. see section 08 71 00

F. Glass Stops: TA-14 removable rolled steel, shape, butted ends. Pre-punch and countersink for flat head tek screws.

G. Prepare frames for ASA 4-7/8” strikes where required. Provide minimum ¼” depth of threads in factory tapped screw holes

H. Installation fasteners (Provided by others)
1. Interior Frames: #6 Drywall type - length sufficient to penetrate studs or structure at least ½”.

2.04 FABRICATION

A. Openings for single swing, pair, borrowed light and sidelight frames to be pre-cut, notched and fabricated at the manufacturer’s facility.

B. Provide hinge reinforcement (TA-11) of 14 guage steel pierced to create depth of thread for hinge screws equal to or exceeding 7 guage steel. Hinge plate to be mechanically attached to hinge emboss on frame

C. Casing Clips: Fabricate frames with factory applied, heat treated clips to ensure no deflection in the clip upon application or removal of casing. Attachment clips may not be of same material as frame

D. Provide notches, tabs and/or stops for positive alignment of frame parts at all corners

E. Mullions to be notched as required to provide tight joints

F. Provide manufacturer's standard mullion brackets for positive connection of frame and mullion parts

G. Provide manufacturer's standard steel glass stop pre-cut to exact length.

H. Provide insert channel full width of borrowed lights installed on finish floor. Provide full width head channel for ceiling height units.

I. Transoms bars fixed type with same profiles as jamb and head

2.05 FINISHING

A. Frame Units: Prefinished with factory applied impact resistant, polyester baked enamel finish or optional electrostatic applied water based paint system

B. Colors:
   1. Color to match existing frames

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify acceptability of existing conditions before starting work.

B. Verify that opening sizes and wall thicknesses are within specified tolerances. Verify that all finishedwalls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install frames in accordance with manufacturer's requirements.

B. Anchor frames with screws located at every casing clip or every 11" as shown on manufacturer's instructions. Field verify quantity and location of fasteners prior to installing casing.

C. Install prefinished frames near end of the project after wall painting and wall coverings.

D. Install frames using qualified installers familiar with installation of prefinished drywall frames.

E. Coordinate installation of glass and glazing in glazed units.

F. Coordinate installation of frames with installation of hardware specified in Section 08 7100.

G. Touch-up blemishes on finished frames with factory prepared touch up paint.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire-rated and non-rated.
   1. Hardwood Veneer doors typical and of species specified.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Door Frames.

B. Section 08 8000 - Glazing.

C. Section 08 7100 - Door Hardware

D. Section 09 9300 - Staining and Transparent Finishing: Field finishing of doors.

1.03 REFERENCE STANDARDS

A. ASTM E 336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings; 1997.

B. ASTM E413 - Classification for Rating Sound Insulation; 2010.

C. ASTM E1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; 1991 (Reapproved 2000).

D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 1999.

E. WH (CERT) - Certification Listings; Warnock Hersey; 1995.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Specimen warranty.

D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.

E. Samples: Submit two samples of door construction & door veneer, 10 x 10 inch in size illustrating wood grain, stain color, and sheen.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

G. Warranty, executed in the Owner's name.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1300, Premium Grade.

B. Finish doors in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1500, grades identified in schedule.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eggers Industries.

B. Algroma Hardwoods.

C. VT Industries, Architectural Doors

D. Weyerhauser Company

E. Oskosh Manufacturing

F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND PANELS

A. Doors: Refer to drawings for locations and additional requirements.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Wood veneer facing for field transparent finish to match existing.
   3. AWI Quality Grade: Premium, Door Type: PC-5ME.

2.03 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Veneer Match: Not more than two veneer match lines per door face.

B. Veneers are to be applied to the crossbanded core in a HOT PRESS using type I exterior water resistant adhesive. Five ply construction.

2.04 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

B. Astragals for Double Doors: Wood, T shaped, overlapping and recessed at mid-door thickness.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Fabricate fire rated doors in accordance with UL requirements. Attach fire rating label to door.

C. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

D. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

E. Sound Rating For Single Door Leaf and Frame Assembly: Minimum STC of 35, calculated in accordance with ASTM E 413, tested in accordance with ASTM E 1408.

F. Provide solid blocks at lock edge for hardware reinforcement.
   1. Provide solid blocking for other throughbolted hardware.

G. Vertical Exposed Edge of Stiles - Hardwood: Of same species as veneer facing.

H. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

I. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

J. Provide edge clearances in accordance with the quality standard specified.

K. Provide edge clearances in accordance with AWI 1600.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

A. Factory finish doors in accordance with specified quality standard:
   1. Transparent Finish: Transparent catalyzed polyurethane, Premium quality, satin sheen.

B. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

F. Install door louvers plumb and level.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over an imaginary 36 by 84 inches surface area.

C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 by 84 inches surface area.

D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inches surface area.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION

SECTION 08 3323
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior non-fire-rated coiling doors.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ITS (DIR) - Directory of Listed Products; current edition.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.

E. NEMA MG 1 - Motors and Generators; 2014.

F. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

G. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general construction, electrical equipment, and component connections and details.

C. Samples: Submit two slats, 10 by 10 inches in size illustrating shape, color and finish texture.

1.05 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:
   1. Amarr; Amarr 4000 Rolling Slat Door: www.amarr.com/commercial/#sle.
   2. Clopay Building Products; Model CERD20: www.clopaydoor.com/#sle.
   3. Raynor Garage Doors; DuraCoil, Model ___: www.raynor.com/#sle.
   4. Wayne-Dalton, a Division of Overhead Door Corporation; ____: www.wayne-dalton.com/#sle.

2.02 COILING DOORS

A. Interior Non-Fire-Rated Coiling Doors Type ___: Steel slat curtain.
   1. Single Thickness Slats: Manufacturer's standard.
   2. Nominal Slat Size: 2 inches wide by required length.
   3. Finish: Anodized, color as selected.
   4. Guides, Formed Sheet Metal: Galvanized steel.
   5. Hood Enclosure: Manufacturer's standard; primed steel.
   6. Electric operation.

7. Mounting: Within framed opening.
8. Locking Devices: Lock and latch handle on outside.

2.03 MATERIALS AND COMPONENTS

A. Metal Curtain Construction: Interlocking slats.
   1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
   2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
   3. Steel Slats: Minimum thickness, 20 gauge, 2 inch; ASTM A653/A653M galvanized steel sheet.

B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

C. Guides - Sheet Metal: Formed from sheet metal, 20 gauge, PER MFR inch thick; PER MFR inch wide.
   1. Hot-Dip Galvanizing: Minimum G90 coating, in compliance with ASTM A653/A653M.

D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
   1. Prime painted.

E. Lock Hardware:
   1. For motor operated units, additional lock or latching mechanisms are not required.
   2. Latch Handle: Manufacturer's standard.

2.04 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.

B. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:
      a. Exterior Coiling Doors: NEMA MG 1, Type 4; open drip proof.
   3. Motor Rating: 1/3 HP; continuous duty.
   4. Motor Voltage: 120 volts, single phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA 250, Type 4.
   7. Opening Speed: 12 inches per second.
   8. Brake: Manufacturer's standard type, activated by motor controller.
   9. Manual override in case of power failure.
   10. See Section 26 0583 for electrical connections.

C. Control Station: Provide standard three button, "Open-Close-Stop" momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify JHS Architects of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 26 0583.

F. Complete wiring from disconnect to unit components.

G. Install enclosure and perimeter trim.

3.03 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.04 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION

SECTION 08 3600
OVERHEAD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazed Aluminum Sectional Overhead Doors

B. Glazed Aluminum Single Leaf-Hinged Overhead Doors

C. Electric Operators and Controls.

D. Operating Hardware, tracks, and support.

1.02 RELATED SECTIONS

A. Section 04 2000 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

B. Section 05500 - Metal Fabrications: Steel frame and supports.

C. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.

D. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.

E. Section 08710 - Door Hardware: Cylinder locks.

F. Section 09900 - Paints and Coatings: Field painting.

G. Section 11150 – Parking Control Equipment: Remote door control.

H. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.

I. Section 16150 - Wiring Connections: Electrical service to door operator.

1.03 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.

B. Wiring Connections: Requirements for electrical characteristics.
   1. 115 volts, single phase, 60 Hz.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 3000.

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.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.08 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 PRODUCTS

2.01 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

A. Manufacturers
   1. Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. Phone: (469) 549-7100. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com.
   2. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

B. Glazed Sectional Overhead Doors (Basis of Design): 521 Series Aluminum Doors by Overhead Door Corporation.
   1. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.
   2. Panel Thickness: 1-3/4 inches (44 mm).
   3. Center Stile Width: 2-11/16 inches (68 mm)
   4. End Stile Width: 3-5/16 inches (84 mm)
   5. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).
   6. Top Rail Width: 3-3/4 inches (95 mm).
   7. Bottom Rail Width: 3-3/4 inches (95 mm).
   8. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.
   9. Stiles and Rails: 6063 - T6 aluminum.
   10. Springs: 100,000 cycles.

C. Glazing:1/2 inch (12.5 mm) Tempered Insulating glass

D. Finish and Color:
   1. Powder Coating Finish: Color as selected by Architect from manufacturer’s standard colors

E. Wind Load Design: Provide to meet the Design/Performance requirements specified.

F. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
   1. Lock: Interior galvanized single unit.

G. Weatherstripping:
   1. Flexible bulb-type strip at bottom section.
   2. Flexible Jamb seals.
   3. Flexible Header seal.

H. Track: Provide track as recommended by manufacturer to suit loading required and clearances available

I. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot or more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.

J. Entrapment Protection: Required for momentary contact, includes radio control operation.
   1. Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
   2. Electric sensing edge monitored to meet UL 325/2010.
   3. Photoelectric sensors monitored to meet UL 325/2010.

K. Operator Controls:
   1. Push-button operated control stations with open, close, and stop buttons.
   2. Surface mounting
   3. Interior location.

L. Special Operation:
   1. Radio control operation.

2.02 GLAZED ALUMINUM SINGLE LEAF-HINGED OVERHEAD DOORS

A. Manufacturers
   1. Renlita Doors North America, LLC; www.evo-doors.com, Phone: 903-583-7500
   2. Flipout Windows, LLC; www.flipoutwindows.com, phone: 949-367-0642
   3. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

B. Glazed Single-leaf Hinged Overhead Doors: Single horizontal panel; tilting vertically on axle and fixed to building structure to tilt outwards and upwards to the open position.

C. Framework: Welded construction fabricated from rolled hollow section steel members with minimum wall thickness of 0.125 inch (3.1 mm). Beams shall be designed for maximum dead load deflection of 1/300th part of the span.

D. Construct steel door sections from carbon steel hot rolled tube complying with ASTM A-500 Grade B and ASTM A-36.

E. Size: As Indicated on Drawings

F. Glazing and Cladding
   1. Glazing: Glass: 1 inch (25 mm) dual pane insulated glass
   2. Glazing Wedges: Co-extrusions, fitted between aluminum profiles

G. Finishes
   1. Finish, Aluminum: Clear Anodized Aluminum

H. Hardware:
   1. Aluminum hinges
   2. (2) Flush bolt locks (nickel plated)
   3. (2) Gas Struts
   4. Pull handle – Rockwood 110-RKWC6B

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 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.

3.03 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.05 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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. This Section includes the following:
   1. Exterior and interior aluminum-framed storefronts.
      a. Glazing is retained mechanically with gaskets on four sides.
      b. Exterior and interior manual-swing aluminum doors.
      c. Exterior and interior aluminum door frames.
      d. Luminance Light Shelf system.
      e. Thermoshade Louver

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.

B. Deflection of Framing Members:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

C. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity but not less than 10 seconds.

D. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

F. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

G. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

H. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K) when tested according to AAMA 1503.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
   1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
   3. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.
   1. Flashing and drainage.

D. Welding certificates.

E. Qualification Data: For Installer

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.

G. Field quality-control test and inspection reports.

H. Maintenance Data: For aluminum-framed systems to include maintenance manuals.

I. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
   1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
      a. Include structural-sealant-glazing quality-control program development and reporting complying with ASTM C 1401 recommendations including, but not limited to, system material qualification procedures, preconstruction sealant-testing program, and procedures and intervals for system fabrication and installation reviews and checks.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Preconstruction Sealant Testing: For structural-sealant-glazed systems, perform sealant manufacturer's standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants and each condition required by aluminum-framed systems.
   1. Test a minimum of five samples of each metal, glazing, and other material.
   2. Prepare samples using techniques and primers required for installed systems.
   3. For materials that fail tests, determine corrective measures required to prepare each material to ensure compatibility with and adhesion of sealants, including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

D. 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)."

E. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."

F. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Field testing shall be performed on mockups according to requirements in Part 3 "Field Quality Control" Article.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      d. Adhesive or cohesive sealant failures.
      e. Water leakage through fixed glazing and framing areas.
      f. Failure of operating components to function properly.
   2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 20 years from date of Substantial Completion.

1.08 PRODUCTS

1.09 MANUFACTURERS

A. Basis-of-Design Product: The design for aluminum-framed systems is based on System # YES 45TU by YKK AP America Inc. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   1. Arch Aluminum & Glass Co., Inc.
   2. United States Aluminum.
   3. Vistawall Architectural Products.
   4. Kawneer Company, Inc.

B. Storefront Framing System:
   1. Description: Center set, exterior flush glazed; jambs and vertical mullions continuous; head, sill, intermediate horizontal attached by screw spline joinery or shear block attachment.
   2. Components: Manufacturer's standard extruded aluminum mullions, 90 degree corner posts, entrance door framing and indicated shapes.
   3. Thermal Barrier: Provide continuous thermal barrier by means of a poured and debridged pocket consisting of a two-part, chemically curing high density polyurethane which is bonded to the aluminum by YKK ThermaBond Plus®. Systems employing non-structural thermal barriers are not acceptable.

C. MATERIALS
1. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 Aluminum Alloy.
2. Aluminum Sheet:
a. Painted Finish: ASTM B 209 (ASTM B 209M), 3003-H14 Aluminum Alloy, 0.080" (1.95 mm)

D. ACCESSORIES
1. Manufacturer's Standard Accessories:
a. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners.
b. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.
c. 0.050 Aluminum Sill Flashing End Dams must have 3 point attachment.

E. FABRICATION
1. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.
2. Hardware: Drill and cut to template for hardware. Reinforce frames and door stiles to receive hardware in accordance with manufacturer's recommendations.
3. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.

1.10 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

1.11 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.
1. PPG SolarBan 70XL Starphire Low-E glazing.

1.12 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.
1. Door Construction: Type with minimum 0.250-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.
2. Door Design: Wide stile; nominal width.
a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
b. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
c. Provide non-removable glazing stops on outside of door.

3. Door Hardware: As specified in Division 8 Section "Door Hardware" and door detail drawing sheet.

1.13 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

1.14 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by de-scaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   6. Provisions for field replacement of glazing from interior.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
   1. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
   2. Provide frame section astragal at double doors to exterior at lap pool room.

F. Doors: Reinforce doors as required for installing hardware.

G. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1.15 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. High Performance Organic Coating Finish:
   1. Type Factory applied two-coat 70% Kynar resin by Arkema or 70% Hylar resin by Solvay Solexis, fluoropolymer based coating system, Polyvinylidene Fluoride (PVF-2), applied in accordance with YKK AP procedures and meeting AAMA 2605 specifications.
   2. Color and Gloss: As selected from manufacturers standard colors.

1.16 EXECUTION

A. EXAMINATION
   1. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. INSTALLATION
1. General:
   a. Comply with manufacturer's written instructions.
   b. Do not install damaged components.
   c. Fit joints to produce hairline joints free of burrs and distortion.
   d. Rigidly secure nonmovement joints.
   e. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
   f. Seal joints watertight, unless otherwise indicated.
2. Metal Protection:
   a. 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.
   b. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
5. Install components plumb and true in alignment with established lines and grades, without warp or rack.
6. Install glazing as specified in Division 8 Section "Glazing."
7. Entrances: Install to produce smooth operation and tight fit at contact points.
   a. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
8. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
9. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
   a. 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.
   b. Alignment:
      1) Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
      2) 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).

C. ADJUSTING
1. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
   a. 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 7100
DOOR HARDWARE

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 commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Automatic operators.

C. Related Sections:
   1. Division 08 Section “Hollow Metal Doors and Frames”.
   2. Division 08 Section “Flush Wood Doors”.
   3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
   8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
   1. ANSI/BHMA Certified Product Standards - A156 Series.
   2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
   3. ANSI/UL 294 - Access Control System Units.
   4. UL 305 - Panic Hardware.
   5. ANSI/UL 437- Key Locks.

1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals

that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.04 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware 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.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult

with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.06 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.07 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. 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. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Please note that ASSA ABLOY is transitioning the Yale Commercial brand to Arrow. This affects only the brand name; the products and product numbers will remain unchanged. The brand transition is expected to be complete in or about May of 2024, and products shipping after that time will be branded Arrow.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:
   a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
   a. Hager Companies (HA) - BB Series, 5 knuckle.
   b. McKinney (MK) - TA/T4A Series, 5 knuckle.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:.
   a. Hager Companies (HA).
   b. Pemko (PE).

2.03 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
   a. Pemko (PE) - EL-CEPT Series.
   b. Securitron (SU) - EL-CEPT Series.
   c. Von Duprin (VD) - EPT-10 Series.

2.04 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
   a. Ives (IV).
   b. Rockwood (RO).
   c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
6. Manufacturers:
    a. Ives (IV).
    b. Rockwood (RO).
    c. Trimco (TC).

2.05 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
1. Manufacturers:
    a. Medeco (MC).
    b. Match Existing, Field Verify.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents.
1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:
    a. Medeco (MC) - X4.
    b. No Substitution.

E. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Three (3).
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.06 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Where specified, provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180-degree viewing angle with protective covering to prevent tampering.
   2. Manufacturers:
      a. Corbin Russwin Hardware (RU) - ML2000 Series.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.
   1. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
   2. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
   3. Locks are to be non-handed and fully field reversible.
   4. Manufacturers:
      a. Corbin Russwin Hardware (RU) - CLX3300 Series.
      b. Marks (MX) – 295 Series.

2.07 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.08 ELECTRIC STRIKES

A. Heavy-Duty Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings designed to accommodate pre-load on fail secure models. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability with field selectable fail-secure/fail-safe and where specified provide latchbolt monitoring.
   1. Manufacturers:
      a. Adams Rite (AD) - 7400 Series.
      b. HES (HS) - 7000/7500 Series.

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.09 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
    1. Manufacturers:
        a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
        b. Von Duprin (VD) - 35A/98 XP Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
    1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
    2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
    3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
    4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
    5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
    6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
   1. Manufacturers:
      a. Corbin Russwin Hardware (RU) - DC8000 Series.
      b. LCN Closers (LC) - 4040XP Series.

2.11 ELECTROMECHANICAL DOOR OPERATORS

A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.
   1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Standard: Conforming to ANSI/BHMA A156.19.

C. Performance Requirements:
   1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
   2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19.

F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. LCN Closers (LC) - 9500 Series.

2.12 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.
   1. Manufacturers:
      a. LCN Door Closers (LC) - SEM7800 Series.
      b. Norton Rixson (RF) - 980/990 Series.
      c. Sargent Manufacturing (SA) - 1560 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
   a. Ives (IV).
   b. Rockwood (RO).
   c. Trimco (TC).

2.14 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Manufacturers:
      a. Ives (IV).
      b. Rockwood (RO).
      c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
   1. Manufacturers:
      a. Norton Rixson (RF).
      b. Rockwood (RO).
      c. Sargent Manufacturing (SA).

2.15 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: 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 UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.16 ELECTRONIC ACCESSORIES

A. Linear Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw plus 50% for the specified electrified hardware and access control equipment.
1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
2. Manufacturers:
a. Alarm Controls (AK) - APS Series.
b. Securitron (SU) - BPS Series.
c. Von Duprin (VD) - PS.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
   1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.05 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   1. Quantities listed are for each pair of doors, or for each single door.
   2. The supplier is responsible for handing and sizing all products.
   3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
   4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

3.09 1. MK - MCKINNEY
3.10 2. PE - PEMKO
3.11 3. RO - ROCKWOOD
3.12 4. VD - VON DUPRIN
3.13 5. MX - MARKS
3.14 6. RU - CORBIN RUSSWIN
3.15 7. IV - IVES
3.16 8. MC - MEDECO
3.17 9. HS - HES
3.18 10. AD - ADAMS RITE
3.19 11. RF - RIXSON
3.20 12. LC - LCN CLOSERS
3.21 13. OT - OTHER
3.22 14. SU - SECURITRON
3.23 HARDWARE SETS
3.24 SET: 1.0
3.25 DOORS: 100A

3.26	**CONTINUOUS HINGE W/CUTOUT**		**CFM__SLF-HD1 PT**			**PE**
3.27	**LOCKABLE REMOVABLE MULLION**		**KR4954**	**689**	**VD**	
3.28	**MULLION MOUNTING KIT**	**MT54**	**689**	**VD**		
3.29	**MULLION STABILIZER**	**154**	**689**	**VD**		
3.30	**RIM EXIT DEVICE**	**LXRXLC QEL 98EO SNB**		**630**	**VD**	
3.31	**VANDAL RESISTANT TRIM**	**VR910-NL**	**630**	**IV**		
3.32	**VANDAL RESISTANT TRIM**	**VR910-DT**	**630**	**IV**		
3.33	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**	
3.34	**SURFACE CLOSER**	**4040XP SCUSH TB**		**689**	**LC**	
3.35	**DROP PLATE**	**4040XP-18PA**	**689**	**LC**		
3.36	**SHOE 4040XP-30**	**689**	**LC**			
3.37	**SPACER**	**4040XP-61**	**689**	**LC**		
3.38	**THRESHOLD**	**252X2AFG**		**PE**		
3.39	**WEATHERSEAL**	**DOOR MANUFACTURER**			**OT**	
3.40	**MULLION SEAL**	**5110BL**		**PE**		
3.41	**SWEEP**	**345CNB**		**PE**		
3.42	**CARD READER**	**BY SECURITY**		**OT**		
3.43	**WIRING & RISER DIAGRAM**	**BY HARDWARE SUPPLIER**				**OT**
3.44	**POWER SUPPLY**	**PS900 SERIES AS REQUIRED**			**VD**	**?**
3.45	**DOOR POSITION SWITCH**	**BY SECURITY**			**OT**	
3.46	**ELECTRIC POWER TRANSFER**		**CEPT-10**	**630**	**SU**	**?**

3.47 NOTES: DOORS CAN BE REMOTELY UNLOCKED THROUGH THE ELECTRONIC ACCESS CONTROL SYSTEM. WHEN LOCKED, EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER, MOMENTARILY RETRACTING EXIT DEVICE LATCHES FOR

ENTRY. FREE EGRESS AT ALL TIMES.

3.48 SET: 2.0

3.49 DOORS: 100B

3.50	**CONTINUOUS HINGE W/CUTOUT**		**CFM SLF-HD1 PT**			**PE**
3.51	**LOCKABLE REMOVABLE MULLION**		**KR4954**	**689**	**VD**	
3.52	**MULLION MOUNTING KIT**	**MT54**	**689**	**VD**		
3.53	**MULLION STABILIZER**	**154**	**689**	**VD**		
3.54	**RIM EXIT DEVICE**	**LXRXLC QEL 98EO SNB**		**630**	**VD**	
3.55	**VANDAL RESISTANT TRIM**	**VR910-NL**	**630**	**IV**		
3.56	**VANDAL RESISTANT TRIM**	**VR910-DT**	**630**	**IV**		
3.57	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**	
3.58	**SURFACE CLOSER**	**4040XP SCUSH TB**		**689**	**LC**	
3.59	**DROP PLATE**	**4040XP-18PA**	**689**	**LC**		
3.60	**SHOE 4040XP-30**	**689**	**LC**			
3.61	**SPACER**	**4040XP-61**	**689**	**LC**		
3.62	**AUTOMATIC OPENER**	**9542**	**628**	**LC**	**?**	
3.63	**THRESHOLD**	**252X2AFG**	**PE**			
3.64	**WEATHERSEAL**	**DOOR MANUFACTURER**			**OT**	
3.65	**MULLION SEAL**	**5110BL**	**PE**			
3.66	**SWEEP**	**345CNB**	**PE**			
3.67	**CARD READER**	**BY SECURITY**		**OT**		
3.68	**WIRING & RISER DIAGRAM**	**BY HARDWARE SUPPLIER**				**OT**
3.69	**ACTUATOR PACKAGE**	**8310-3860T**		**LC**		
3.70	**POWER SUPPLY**	**PS900 SERIES AS REQUIRED**			**VD**	**?**
3.71	**DOOR POSITION SWITCH**	**BY SECURITY**			**OT**	
3.72	**ELECTRIC POWER TRANSFER**		**CEPT-10**	**630**	**SU**	**?**

3.73 NOTES: DOORS CAN BE REMOTELY UNLOCKED THROUGH THE ELECTRONIC ACCESS CONTROL SYSTEM. WHEN LOCKED, EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER, MOMENTARILY RETRACTING EXIT DEVICE LATCHES FOR ENTRY. FREE EGRESS AT ALL TIMES. COORDINATE AUTOMATIC OPENER FUNCTION WITH SECURITY.

3.74 SET: 3.0

3.75 DOORS: 138

3.76	**CONTINUOUS HINGE W/CUTOUT**		**CFM SLF-HD1 PT**			**PE**
3.77	**RIM EXIT DEVICE**	**LXRXLC QEL 98EO SNB**		**630**	**VD**	
3.78	**VANDAL RESISTANT TRIM**	**VR910-NL**	**630**	**IV**		
3.79	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**	
3.80	**SURFACE CLOSER**	**4040XP SCUSH TB**		**689**	**LC**	
3.81	**DROP PLATE**	**4040XP-18PA**	**689**	**LC**		
3.82	**SHOE 4040XP-30**	**689**	**LC**			
3.83	**SPACER**	**4040XP-61**	**689**	**LC**		
3.84	**THRESHOLD**	**252X2AFG**	**PE**			

3.85	WEATHERSEAL	DOOR MANUFACTURER			OT	
3.86	SWEEP	345CNB	PE			
3.87	CARD READER	BY SECURITY		OT		
3.88	WIRING & RISER DIAGRAM	BY HARDWARE SUPPLIER				OT
3.89	POWER SUPPLY	PS900 SERIES AS REQUIRED			VD	?
3.90	DOOR POSITION SWITCH	BY SECURITY			OT	
3.91	ELECTRIC POWER TRANSFER		CEPT-10	630	SU	?
3.92	NOTES: DOOR IS NORMALLY CLOSED AND LOCKED. EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER, MOMENTARILY RETRACTING EXIT DEVICE LATCH FOR ENTRY. FREE EGRESS AT ALL TIMES.					
3.93	SET: 4.0					
3.94	DOORS: 145					
3.95	CONTINUOUS HINGE W/CUTOUT		CFM__SLF-HD1 PT			PE
3.96	RIM EXIT DEVICE	LXRXLC QEL 98EO SNB		630	VD	
3.97	VANDAL RESISTANT TRIM	VR910-NL	630	IV		
3.98	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC	
3.99	AUTOMATIC OPENER	9542	628	LC	?	
3.100	THRESHOLD	252X2AFG	PE			
3.101	WEATHERSEAL	DOOR MANUFACTURER			OT	
3.102	SWEEP	345CNB	PE			
3.103	CARD READER	BY SECURITY		OT		
3.104	WIRING & RISER DIAGRAM	BY HARDWARE SUPPLIER				OT
3.105	ACTUATOR PACKAGE	8310-3860T		LC		
3.106	POWER SUPPLY	PS900 SERIES AS REQUIRED			VD	?
3.107	DOOR POSITION SWITCH	BY SECURITY			OT	
3.108	ELECTRIC POWER TRANSFER		CEPT-10	630	SU	?
3.109	NOTES: DOOR IS NORMALLY CLOSED AND LOCKED. EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER, MOMENTARILY RETRACTING EXIT DEVICE LATCH FOR ENTRY. FREE EGRESS AT ALL TIMES. COORDINATE AUTOMATIC OPENER FUNCTION WITH SECURITY.					
3.110	SET: 5.0					
3.111	DOORS: 101A					
3.112	CONTINUOUS HINGE W/CUTOUT		CFM__SLF-HD1 PT			PE
3.113	LOCKABLE REMOVABLE MULLION		KR4954	689	VD	
3.114	MULLION MOUNTING KIT	MT54	689	VD		
3.115	MULLION STABILIZER	154	689	VD		
3.116	RIM EXIT DEVICE	LXRXLC QEL 98EO SNB		630	VD	
3.117	VANDAL RESISTANT TRIM	VR910-NL	630	IV		
3.118	VANDAL RESISTANT TRIM	VR910-DT	630	IV		
3.119	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC	
3.120	SURFACE CLOSER	4040XP SCUSH TB		689	LC	
3.121	DROP PLATE	4040XP-18PA	689	LC		

3.122	SHOE 4040XP-30	689	LC				
3.123	SPACER	4040XP-61	689	LC			
3.124	THRESHOLD	271A		PE			
3.125	WEATHERSEAL	DOOR MANUFACTURER				OT	
3.126	MULLION SEAL	5110BL		PE			
3.127	SWEEP	315CN		PE			
3.128	CARD READER	BY SECURITY			OT		
3.129	WIRING & RISER DIAGRAM	BY HARDWARE SUPPLIER					OT
3.130	DOOR RELEASE BUTTON	BY SECURITY				OT	
3.131	POWER SUPPLY	PS900 SERIES AS REQUIRED				VD	?
3.132	DOOR POSITION SWITCH	BY SECURITY				OT	
3.133	ELECTRIC POWER TRANSFER			CEPT-10	630	SU	?
3.134	NOTES: DOORS CAN BE REMOTELY UNLOCKED THROUGH THE ELECTRONIC ACCESS CONTROL SYSTEM. WHEN LOCKED, EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER OR REMOTE RELEASE AT FRONT OFFICE, MOMENTARILY RETRACTING EXIT DEVICE LATCHES FOR ENTRY. FREE EGRESS AT ALL TIMES.						
3.135	SET: 6.0						
3.136	DOORS: 101B, 178						
3.137	CONTINUOUS HINGE W/CUTOUT			CFM SLF-HD1 PT			PE
3.138	LOCKABLE REMOVABLE MULLION			KR4954	689	VD	
3.139	MULLION MOUNTING KIT	MT54		689	VD		
3.140	MULLION STABILIZER	154		689	VD		
3.141	RIM EXIT DEVICE	LXRXLC QEL 98EO SNB			630	VD	
3.142	VANDAL RESISTANT TRIM	VR910-NL		630	IV		
3.143	VANDAL RESISTANT TRIM	VR910-DT		630	IV		
3.144	CYLINDER	VERIFY & MATCH EXISTING - GMK			26	MC	
3.145	SURFACE CLOSER	4040XP SCUSH TB			689	LC	
3.146	DROP PLATE	4040XP-18PA		689	LC		
3.147	SHOE 4040XP-30	689	LC				
3.148	SPACER	4040XP-61	689	LC			
3.149	AUTOMATIC OPENER	9542		628	LC	?	
3.150	THRESHOLD	271A		PE			
3.151	WEATHERSEAL	DOOR MANUFACTURER				OT	
3.152	MULLION SEAL	5110BL		PE			
3.153	SWEEP	315CN		PE			
3.154	CARD READER	BY SECURITY			OT		
3.155	WIRING & RISER DIAGRAM	BY HARDWARE SUPPLIER					OT
3.156	DOOR RELEASE BUTTON	BY SECURITY				OT	
3.157	ACTUATOR PACKAGE	8310-3860T			LC		
3.158	POWER SUPPLY	PS900 SERIES AS REQUIRED				VD	?
3.159	DOOR POSITION SWITCH	BY SECURITY				OT	

3.160	ELECTRIC POWER TRANSFER		CEPT-10	630	SU	?
3.161	NOTES: DOORS CAN BE REMOTELY UNLOCKED THROUGH THE ELECTRONIC ACCESS CONTROL SYSTEM. WHEN LOCKED, EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER OR REMOTE RELEASE AT FRONT OFFICE, MOMENTARILY RETRACTING EXIT DEVICE LATCHES FOR ENTRY. FREE EGRESS AT ALL TIMES. COORDINATE AUTOMATIC OPENER FUNCTION WITH SECURITY.					
3.162	SET: 7.0					
3.163	DOORS: 140C, 140D, 141A, 144G					
3.164	HINGE, FULL MORTISE, HVY WT		T4A3386 NRP		US32D	MK
3.165	RIM EXIT ONLY	98 EO	630	VD		
3.166	VANDAL RESISTANT TRIM	VR910-NL	630	IV		
3.167	CYLINDER	VERIFY & MATCH EXISTING - GMK	26		MC	
3.168	SURFACE CLOSER	4040XP SCUSH TB	689		LC	
3.169	KICK PLATE	K1050 12" CSK BEV	US32D	RO		
3.170	THRESHOLD	273X3AFG	PE			
3.171	GASKETING	2893AV	PE			
3.172	GASKETING	2903AV	PE			
3.173	DOOR BOTTOM	216AFG	PE			
3.174	SET: 8.0					
3.175	DOORS: 102A					
3.176	CONTINUOUS HINGE	CFM__SL-HD1			PE	
3.177	STOREROOM LOCK	295RF	US26D	MX		
3.178	CYLINDER	VERIFY & MATCH EXISTING - GMK	26		MC	
3.179	SMART PAC BRIDGE RECTIFIER		2005M3		HS	?
3.180	ELECTRIC STRIKE	7400	630	AD	?	
3.181	BUZZER	2006M	HS	?		
3.182	SURFACE CLOSER	4040XP REGARM TB	689		LC	
3.183	DROP PLATE	4040XP-18	689	LC		
3.184	CONC OVERHEAD STOP	1-_36	652	RF		
3.185	SEAL/SILENCERS	DOOR/FRAME MANUFACTURER			OT	
3.186	CARD READER	BY SECURITY		OT		
3.187	LOW VOLTAGE POWER	BY SECURITY			OT	
3.188	WIRING & RISER DIAGRAM	BY HARDWARE SUPPLIER				OT
3.189	DOOR RELEASE BUTTON	BY SECURITY			OT	
3.190	DOOR POSITION SWITCH	BY SECURITY			OT	
3.191	NOTES: DOOR IS NORMALLY CLOSED AND LOCKED. EXTERIOR ACCESS BY PRESENTING A VALID CREDENTIAL TO READER OR BY REMOTE RELEASE AT FRONT OFFICE, MOMENTARILY RELEASING ELECTRIC STRIKE FOR ENTRY. FREE EGRESS AT ALL TIMES.					
3.192	SET: 9.0					
3.193	DOORS: 102B					
3.194	CONTINUOUS HINGE	CFM__SL-HD1			PE	
3.195	ENTRY LOCK	295RAB	US26D	MX		

3.196	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.197	SURFACE CLOSER	4040XP REGARM TB		689	LC
3.198	DROP PLATE	4040XP-18	689	LC	
3.199	WALL STOP	403	US26D	RO	
3.200	SEAL/SILENCERS	DOOR/FRAME MANUFACTURER			OT
3.201	SET: 10.0				
3.202	DOORS: 176B				
3.203	CONTINUOUS HINGE	CFM SL-HD1			PE
3.204	LOCKABLE REMOVABLE MULLION		KR4954	689	VD
3.205	MULLION MOUNTING KIT	MT54	689	VD	
3.206	MULLION STABILIZER	154	689	VD	
3.207	RIM EXIT DUMMY	98 LDT 996L-DT	17	630	VD
3.208	RIM EXIT DEVICE	98 L 996L	17	630	VD
3.209	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.210	SURFACE CLOSER	4040XP SCUSH TB		689	LC
3.211	DROP PLATE	4040XP-18PA	689	LC	
3.212	SHOE	4040XP-30	689	LC	
3.213	SPACER	4040XP-61	689	LC	
3.214	MULLION SEAL	5110BL		PE	
3.215	SEAL/SILENCERS	DOOR/FRAME MANUFACTURER			OT
3.216	SET: 11.0				
3.217	DOORS: 120B, 121A, 129, 130A				
3.218	CONTINUOUS HINGE	CFM SL-HD1			PE
3.219	CLASSROOM INTRUDER LOCK		295RDB	US26D	MX
3.220	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.221	SURFACE CLOSER	4040XP SCUSH TB		689	LC
3.222	DROP PLATE	4040XP-18PA	689	LC	
3.223	SHOE	4040XP-30	689	LC	
3.224	SPACER	4040XP-61	689	LC	
3.225	SEAL/SILENCERS	DOOR/FRAME MANUFACTURER			OT
3.226	SET: 12.0				
3.227	DOORS: 123B, 124A, 127A, 132B, 135A, 136B, 177A				
3.228	CONTINUOUS HINGE	CFM SL-HD1			PE
3.229	CLASSROOM INTRUDER LOCK		295RDB	US26D	MX
3.230	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.231	DROP PLATE	4040XP-18PA	689	LC	
3.232	SHOE	4040XP-30	689	LC	
3.233	SPACER	4040XP-61	689	LC	

3.234	SURFACE CLOSER	4040XP REG/EDA TB		689	LC	
3.235	WALL STOP	403	US26D	RO		
3.236	SEAL/SILENCERS	DOOR/FRAME MANUFACTURER			OT	
3.237	SET: 13.0					
3.238	DOORS: 119B, 125B, 126, 131A, 133A					
3.239	HINGE, FULL MORTISE, HVY WT	T4A3786 NRP			US26D	MK
3.240	SVR EXIT ONLY	9827 EO LBR	630	VD		
3.241	SVR NIGHTLATCH	9827 LNL LBR 996L-NL	17		630	VD
3.242	CYLINDER	VERIFY & MATCH EXISTING - GMK	26		MC	
3.243	SURFACE CLOSER	4040XP REG/EDA TB		689	LC	
3.244	KICK PLATE	K1050 12" CSK BEV	US32D	RO		
3.245	ELECTROMAGNETIC HOLDER	998M		689	RF	?
3.246	SILENCER	608-RKW	RO			
3.247	SET: 14.0					
3.248	DOORS: 119A, 125A, 131B, 133B					
3.249	HINGE, FULL MORTISE, HVY WT	T4A3786 NRP			US26D	MK
3.250	RIM EXIT DEVICE	98 L 996L	17	630	VD	
3.251	CYLINDER	VERIFY & MATCH EXISTING - GMK	26		MC	
3.252	SURFACE CLOSER	4040XP REG/EDA TB		689	LC	
3.253	KICK PLATE	K1050 12" CSK BEV	US32D	RO		
3.254	ELECTROMAGNETIC HOLDER	998M		689	RF	?
3.255	SILENCER	608-RKW	RO			
3.256	SET: 15.0					
3.257	DOORS: 176A					
3.258	HINGE, FULL MORTISE, HVY WT	T4A3786 NRP			US26D	MK
3.259	LOCKABLE REMOVABLE MULLION	KR4954	689	VD		
3.260	MULLION MOUNTING KIT	MT54	689	VD		
3.261	MULLION STABILIZER	154	689	VD		
3.262	RIM EXIT DUMMY	98 LDT 996L-DT	630	VD		
3.263	RIM EXIT DEVICE	98 L 996L	17	630	VD	
3.264	CYLINDER	VERIFY & MATCH EXISTING - GMK	26		MC	
3.265	SURFACE CLOSER	4040XP SCUSH TB		689	LC	
3.266	KICK PLATE	K1050 12" CSK BEV	US32D	RO		
3.267	WALL STOP	403	US26D	RO		
3.268	MULLION SEAL	5110BL		PE		
3.269	SILENCER	608-RKW	RO			
3.270	SET: 16.0					
3.271	DOORS: 110					
3.272	HINGE, FULL MORTISE, HVY WT	T4A3786 NRP			US26D	MK
3.273	MANUAL FLUSH BOLT	555/557	US26D	RO		

3.274	DUST PROOF STRIKE	570	US26D	RO	
3.275	STOREROOM LOCK	295RF	US26D	MX	
3.276	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.277	ARMOR PLATE	K1050 (-F) 36" CSK BEV		US32D	RO
3.278	WALL STOP	403	US26D	RO	
3.279	EDGE GUARD	310/310B 36"		US32D	RO
3.280	SILENCER	608-RKW		RO	
3.281	SET: 17.0				
3.282	DOORS: 105, 144C, 144F				
3.283	HINGE, FULL MORTISE, HVY WT		T4A3786	US26D	MK
3.284	STOREROOM LOCK	295RF	US26D	MX	
3.285	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.286	SURFACE CLOSER	4040XP REG/EDA TB		689	LC
3.287	KICK PLATE	K1050 12" CSK BEV	US32D	RO	
3.288	WALL STOP	403	US26D	RO	
3.289	SILENCER	608-RKW		RO	
3.290	SET: 18.0				
3.291	DOORS: 174C				
3.292	HINGE, FULL MORTISE, HVY WT		T4A3786	US26D	MK
3.293	STOREROOM LOCK	295RF	US26D	MX	
3.294	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.295	SURFACE CLOSER	4040XP REG/EDA TB		689	LC
3.296	KICK PLATE	K1050 12" CSK BEV	US32D	RO	
3.297	WALL STOP	403	US26D	RO	
3.298	SILENCER	608-RKW		RO	
3.299	SET: 19.0				
3.300	DOORS: 103, 106A				
3.301	HINGE, FULL MORTISE	TA2714	US26D	MK	
3.302	ENTRY LOCK	295RAB	US26D	MX	
3.303	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.304	KICK PLATE	K1050 12" CSK BEV	US32D	RO	
3.305	WALL STOP	403	US26D	RO	
3.306	GASKETING	S44BL		PE	
3.307	SET: 20.0				
3.308	DOORS: 106B, 106C				
3.309	CONTINUOUS HINGE	CFM__SL-HD1			PE
3.310	ENTRY LOCK	295RAB	US26D	MX	
3.311	CYLINDER	VERIFY & MATCH EXISTING - GMK		26	MC
3.312	WALL STOP	403	US26D	RO	
3.313	SEAL/SILENCERS	DOOR/FRAME MANUFACTURER			OT

3.314	**SET: 21.0**				
3.315	**DOORS: 109**				
3.316	**HINGE, FULL MORTISE, HVY WT**		**T4A3786**	**US26D**	**MK**
3.317	**CLASSROOM INTRUDER LOCK**		**295RDB**	**US26D**	**MX**
3.318	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**
3.319	**SURF OVERHEAD STOP**	**9- 36**	**652**	**RF**	
3.320	**SURFACE CLOSER**	**4040XP REGARM TB**		**689**	**LC**
3.321	**KICK PLATE**	**K1050 12" CSK BEV**	**US32D**	**RO**	
3.322	**GASKETING**	**S44BL**	**PE**		
3.323	**SET: 22.0**				
3.324	**DOORS: 120A, 122A, 122B, 123A, 124B, 127B, 128A, 128B, 130B, 135B, 136A, 139A, 139B, 142A, 142B, 143A**				
3.325	**HINGE, FULL MORTISE, HVY WT**		**T4A3786**	**US26D**	**MK**
3.326	**CLASSROOM INTRUDER LOCK**		**295RDB**	**US26D**	**MX**
3.327	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**
3.328	**SURFACE CLOSER**	**4040XP REG/EDA TB**		**689**	**LC**
3.329	**KICK PLATE**	**K1050 12" CSK BEV**	**US32D**	**RO**	
3.330	**WALL STOP**	**403**	**US26D**	**RO**	
3.331	**GASKETING**	**S44BL**	**PE**		
3.332	**SET: 22.1**				
3.333	**DOORS: 139C, 142C, 143C**				
3.334	**HINGE, FULL MORTISE, HVY WT**		**T4A3786**	**US26D**	**MK**
3.335	**CLASSROOM INTRUDER LOCK**		**295RDB**	**US26D**	**MX**
3.336	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**
3.337	**SURFACE CLOSER**	**4040XP REG/EDA TB**		**689**	**LC**
3.338	**KICK PLATE**	**K1050 12" CSK BEV**	**US32D**	**RO**	
3.339	**WALL STOP**	**403**	**US26D**	**RO**	
3.340	**THRESHOLD**	**151A**	**PE**		
3.341	**ACOUSTIC SEAL SET**	**PEMKOSTCSET-1E**		**BL**	**PE**
3.342	**SET: 23.0**				
3.343	**DOORS: 118, 132A, 153, 174A, 174B, 175, 177B**				
3.344	**HINGE, FULL MORTISE, HVY WT**		**T4A3786**	**US26D**	**MK**
3.345	**CLASSROOM INTRUDER LOCK**		**295RDB**	**US26D**	**MX**
3.346	**CYLINDER**	**VERIFY & MATCH EXISTING - GMK**		**26**	**MC**
3.347	**SURFACE CLOSER**	**4040XP REG/EDA TB**		**689**	**LC**
3.348	**KICK PLATE**	**K1050 12" CSK BEV**	**US32D**	**RO**	
3.349	**WALL STOP**	**403**	**US26D**	**RO**	
3.350	**GASKETING**	**S44BL**	**PE**		
3.351	**SET: 24.0**				
3.352	**DOORS: 104, 144B, 154, E155**				
3.353	**HINGE, FULL MORTISE, HVY WT**		**T4A3786**	**US26D**	**MK**

3.354	INDICATOR PRIVACY LOCK	ML2030 PSA M34 V21		626	RU
3.355	SURFACE CLOSER	4040XP REG/EDA TB		689	LC
3.356	KICK PLATE	K1050 12" CSK BEV	US32D	RO	
3.357	MOP PLATE	K1050 8" CSK BEV	US32D	RO	
3.358	WALL STOP	403	US26D	RO	
3.359	GASKETING	S44BL		PE	
3.360	SET: 25.0				
3.361	DOORS: 141D, 144D				
3.362	HINGE, FULL MORTISE, HVY WT		T4A3386	US32D	MK
3.363	INDICATOR PRIVACY LOCK	ML2030 PSA M34 V21		626	RU
3.364	SURFACE CLOSER	4040XP REG/EDA TB		689	LC
3.365	KICK PLATE	K1050 12" CSK BEV	US32D	RO	
3.366	MOP PLATE	K1050 8" CSK BEV	US32D	RO	
3.367	WALL STOP	403	US26D	RO	
3.368	GASKETING	S44BL		PE	
3.369	SET: 26.0				
3.370	DOORS: 143B				
3.371	HINGE, FULL MORTISE, HVY WT		T4A3786	US26D	MK
3.372	PASSAGE LATCH 295N	US26D	MX		
3.373	SURF OVERHEAD STOP	9- 36	652	RF	
3.374	SURFACE CLOSER	4040XP REGARM TB		689	LC
3.375	KICK PLATE	K1050 12" CSK BEV	US32D	RO	
3.376	SILENCER	608-RKW		RO	
3.377	SET: 27.0				
3.378	DOORS: 140A, 140B, 141B, 141C, 144A, 144E, 144H, 144J				
3.379	HARDWARE	DOOR MANUFACTURER			OT

END OF SECTION

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulated double Glass units for exterior applications.

B. Includes Storefront, Aluminum Framed Doors, Sidelites and Windows within storefront sections.

C. Single Pane Glazing for interior borrowed lites and windows. (See Window Schedule.)

D. Single Pane Glazing thickness to match existing at exterior windows where shown on drawings.

E. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 1213 - Hollow Metal Frames

B. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.

1.03 REFERENCE STANDARDS

A. ASTM C1036 - Standard Specification for Flat Glass; 2011.

B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1996.

E. ASTM E773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units; 2001.

F. ASTM E774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units; 1997.

G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

H. GANA (SM) - GANA Sealant Manual; 2008.

1.04 PERFORMANCE REQUIREMENTS

A. Select type and thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with IBC code.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Certificates: Certify that products meet or exceed specified requirements.

E. Manufacturer's Certificate: Certify that insulating glass meets or exceeds specified requirements.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and SIGMA TM-3000 Glazing Guidelines for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

1.09 MAINTENANCE PRODUCTS

A. Provide two of each common glass size of insulated glass units.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS

A. Type IG-1 - Sealed Insulating Glass Units: Vision glass, double glazed.

2.02 GLASS MATERIALS

A. Float Glass Manufacturers:
   1. Visteon Glass Systems: www.visteon.com/floatglass.
   2. Pilkington LOF.
   3. PPG Industries, Inc.
   4. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Float Glass: Provide float glass based glazing unless noted otherwise.

2.03 COMPONENTS

A. Clear Float Glass : Clear, annealed.
   1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   2. 1/4 inch minimum thick.

B. Safety Glass : Clear; fully tempered with horizontal tempering where required.
   1. Laminated with plastic (polycarbonite) interlayer; interlayer thickness of 0.030 ".
   2. Comply with ASTM C 1048, Condition A uncoated, Type 1 transparent flat, Class 1, Quality q3 glazing select.
   3. Comply with ANSI Z97.1.
   4. CSPS Glazing Standards: Catagory II.
   5. Tempered Thickness: 1/4 inch minimum thick.

C. Low E Glass : Float type, annealed, clear.

2.04 SEALED INSULATING GLASS UNITS

A. Manufacturers of glass products:
   1. Any of the manufacturers specified for float glass.

B. Fabricators of sealed insulating units:
   1. Guardian Industries Corp: www.guardian.com.
   2. Interpane Glass Company: www.interpane.com.

3. Viracon, Apogee Enterprises, Inc: www.viracon.com/#sle.
4. Capitol Glass Co., SLC, Utah.
5. Substitutions: Refer to Section 01 6000 - Product Requirements.

C. Sealed Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Edge Spacers: Aluminum, bent and soldered corners.
3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
4. Purge interpane space with dry hermetic air.

D. Insulated Glass Units : Double pane with glass to elastomer edge seal.
1. Outer pane of 1/4" glass, inner pane of 1/4" glass.
2. Place reflective coating on No.2 surface within the unit.
3. Comply with ASTM E 774 and E 773, Class CBA.
4. Purge interpane space with dry hermetic air.
5. Total unit thickness of 1 inch minimum.

2.05 FABRICATIONS, 1" SEALED INSULATING UNITS

A. Visteon
1. Outer Pane: Versalux 1/4" Grey 2000 R heat strengthened with grey reflective on the #2 surface.
2. Interior Pane: 1/4" clear with Low E on the #3 surface.
3. Transmittance, Total Solar Energy: 11%
4. Reflectance, Visible Light: 17%
5. Reflectance, Total Solar Energy: 9%
6. Shading Coefficient: 0.23
7. Solar Heat Gain Coefficient: 0.20
8. Light to Solar Gain (LSG): NA
9. U Value, Winter Night-time: 0.33

B. PPG Industries
1. Outer Pane: 1/4" SolorCool Azurlite heat strengthened with grey reflective on the #2 surface.
2. Interior Pane: 1/4" clear Sungate 100 with Low E on the #3 surface.
3. Transmittance, Total Solar Energy: 9%
4. Reflectance, Visible Light: 19%
5. Reflectance, Total Solar Energy: 10%
6. Shading Coefficient: 0.20
7. Solar Heat Gain Coefficient: 0.17
8. Light to Solar Gain (LSG): 1.24
9. U Value, Winter Night-time: 0.31

C. Pilkington LOF
1. Outer Pane: 1/4" heat strengthened with grey reflective on the #2 surface.
2. Interior Pane: 1/4" clear Energy Advantage with Low E on the #3 surface.
3. Transmittance, Total Solar Energy: 15%
4. Reflectance, Visible Light: 25%
5. Reflectance, Total Solar Energy: 12%
6. Shading Coefficient: 0.31
7. Solar Heat Gain Coefficient: 0.27
8. Light to Solar Gain (LSG): 0.
9. U Value, Winter Night-time: 0.48

2.06 GLAZING COMPOUNDS

A. Manufacturers:
   1. GE Plastics: www.geplastics.com.
   2. Pecora Corporation: www.pecora.com/#sle.
   3. Butyl Sealant: Single componentASTM C 920, Grade NS, Class 12-1/2, Uses M and A;, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; chemicalneutral curing; capable of water immersion without loss of properties; non-bleeding, non-stainingASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected to match adjacent wall surface.

2.07 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.
   1. Manufacturers:
      a. Pecora Corporation: www.pecora.com/#sle.
      b. Tremco Global Sealants: www.tremcosealants.com/#sle.
      c. Saint-Gobain Performance Plastics: www.plastics.saint-gobain.com.
      d. Substitutions: Refer to Section 01 6000 - Product Requirements.

C. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slotASTM C864 Option I;; ASTM C864 Option II; black color.

D. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with silcone sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.04 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING) @ STOREFRONT

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.05 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

3.06 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.07 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud framing, joists and hat channel furring.

B. Suspended metal support framing for ceiling.

C. Gypsum sheathing.

D. Gypsum wallboard 5/8" Type X.

E. Joint treatment and accessories.

F. Textured finish system.

1.02 RELATED REQUIREMENTS

A. Section 07 9005 - Joint Sealers: Paintable acrylic type.

B. Section 09 9000 - Painting and Coatings.

1.03 REFERENCE STANDARDS

A. AISI S220 - North American Standard for Cold-Formed Steel Framing - Nonstructural Members; 2015.

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015.

C. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

D. ASTM C 36 - Standard Specification for Gypsum Wallboard; 2001.

E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

F. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009).

G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

K. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

L. ICC (IBC) - International Building Code; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on metal framing.

C. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture. Match existing texture.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 GYPSUM BOARD:

A. G-P Gypsum Corporation: www.gp.com.
   1. National Gypsum Company: www.nationalgypsum.com.
   2. USG Corporation: www.usg.com.
   3. Gold Bond Building Products .
   4. Celotex.
   5. Georgia Pacific.

2.03 METAL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.

B. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Dietrich Metal Framing: www.dietrichindustries.com.
   3. Phillips Manufacturing Company: www.phillipsmfg.com.

C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated and as indicated on the drawings, with maximum deflection of wall framing of L/120 at 7.5 psf.
   1. Exception: The minimum metal thickness and section properties requirements of ASTM C645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E72 using assemblies specified by ASTM C754.
      a. Acceptable Products:
         1) Clark Western Building Systems; UltraSteel (tm): www.clarkwestern.com.

D. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, size and gage to comply with ASTM C 754 at spacing indicated; maximum deflection L/240 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

2.04 BOARD MATERIALS

A. Gypsum Wallboard: 5/8" gypsum board over 1/4" aluminum plate shielding. Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.

B. Paper-Faced Product Manufacturers:
   1. American Gypsum; EagleRoc Regular Gypsum Wallboard and FireBloc Type X Gypsum Wallboard.
   2. CertainTeed Corporation; ProRoc Brand Gypsum Board.
   3. CertainTeed Corporation; ProRoc Brand Abuse Resistant Gypsum Board.
   4. Georgia-Pacific Gypsum; ToughRock.
   5. Lafarge North America Inc; Regular Drywall and Firecheck Type X and Type C.
   6. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
   7. USG Corporation; Sheetrock Brand Gypsum Panels.

2.05 ACCESSORIES

A. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Ready-mixed vinyl-based joint compound.

B. Textured Finish Materials: Latex-based compound.

C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Furring Channels Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

D. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
   1. Laterally brace entire suspension system.

C. Metal Hat Channel Furring: Space metal furring at 16 inches on center.

3.03 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.04 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Corner Beads: Install at external corners, using longest practical lengths.

B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

B. Finish all gypsum board in accordance with ASTM C 840 Level 4.

C. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.07 TEXTURE FINISH

A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Ceramic accessories.

E. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07 9005 - Joint Sealers.

B. Section 09 2116 - Gypsum Board Assemblies: Installation of tile backer board.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.

B. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.

C. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).

D. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).

E. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Maintain one copy of The Tile Council of North America Handbook and ANSI A108 Series/A118 Series on site.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products by the same manufacturer.
   1. American Olean Corporation: www.americanolean.com/#sle.
   2. Dal-Tile Corporation: www.daltile.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Porcelain Tile:
   1. Location: Restroom floor tile.
   2. Basis of Design: Daltile "Veranda".
   3. Color: "Gravel" P501
   4. Size: 20"x13" inch, nominal.

C. Porcelain Tile:
   1. Location: Restroom wall base tile.
   2. Basis of Design: Daltile "Veranda" S-36E9T.
   3. Color: "Gravel" P501
   4. Size: [6"x13"] inch, nominal.

D. Porcelain Tile:
   1. Location: Restroom wall tile.
   2. Basis of Design: Daltile "Veranda".
   3. Color: "Sand" P505
   4. Size: [6.5"x20"] inch, nominal.

E.

2.02 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Satin brass anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Applications:
      a. Open edges of wall tile.
      b. Open edges of floor tile.
      c. Wall corners, outside and inside.
   2. Manufacturers:
      a. Schluter-Systems: www.schluter.com/#sle.
      b. Genesis APS International: www.genesis-aps.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
   1. ARDEX Engineered Cements; _____: www.ardexamericas.com/#sle.
   2. Bostik Inc; _____: www.bostik-us.com/#sle.
   3. Custom Building Products; _____: www.custombuildingproducts.com/#sle.
   4. H.B. Fuller Construction Products, Inc; ____: www.tecspecialty.com/#sle.
   5. LATICRETE International, Inc; _____: www.laticrete.com/#sle.
   6. Merkrete, by Parex USA, Inc; _____: www.merkrete.com/#sle.

C. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
   1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
   2. Products:
      a. ARDEX Engineered Cements; ARDEX N 23 MICROTEC: www.ardexamericas.com/#sle.
      b. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com/#sle.

c. H.B. Fuller Construction Products, Inc; TEC Ultimate Large Tile Mortar: www.tecspecialty.com/#sle.
d. LATICRETE International, Inc; 257 TITANIUM: www.laticrete.com/#sle.
e. Merkrete, by Parex USA, Inc; Merkrete 735 Premium Flex: www.merkrete.com/#sle.
f. Sika Corp; SikaTile 300 Set: www.sika.com/#sle.
g. Substitutions: See Section 01 6000 - Product Requirements.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
1. ARDEX Engineered Cements; _____: www.ardexamericas.com/#sle.
2. ProSpec, an Oldcastle brand; ProColor Sanded Tile Grout: www.prospec.com.
3. Bostik Inc; ____: www.bostik-us.com/#sle.
4. Mapei Corporation
5. Custom Building Products; _____: www.custombuildingproducts.com/#sle.
6. H.B. Fuller Construction Products, Inc; ____: www.tecspecialty.com/#sle.
7. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
8. Merkrete, by Parex USA, Inc; Merkrete Duracolor Non-Sanded Color Grout: www.merkrete.com/#sle.
9. Substitutions: See Section 01 6000 - Product Requirements.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Color(s): As selected by JHS Architects from manufacturer's full line.
2. Epoxy grout mixture: Commercial portland cement specified by manufacturer. An on-the-job mixture of white or gray fine graded aggregate that complies with manufacturer's recommendations
3. Mix mortars and grouts to comply with requriements of referenced standards and manufacturer's including those for accurate proportioning of materials, water, or additive content, type of mixing equipment, selection of mixer speeds, mixing containters, mixing time, and otehr procedures needed to produce mortars and grouts of uniform quality with optimum performance charaacteristics for application indicated.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

C. Suspended metal grid ceiling filled with (only) Polycarbonate Sheet Stock.

D. Polycarbonate sheet stock for skylights shown on drawings.

1.02 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

E. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scscertified.com.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Samples: Submit two full size samples illustrating material and finish of acoustical units.

C. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.04 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers and Product Selection:
   1. Armstrong World Industries, Inc: www.armstrong.com.
   2. USG: usg.com
   3. Certainteed: certainteed.com
   4. Substitutions will be evaluated for similar texture and quality characteristics.

5. Substitutions: See Section 01 6000 - Product Requirements.

B. Acoustical Panels: Painted mineral fiber, with the following characteristics:
   1. Classification: ASTM E1264 Type III.
      a. Form: 2, water felted.
      b. Pattern: "D" - fissured.
   2. Size: 24 by 48 inches.
   3. Thickness: 5/8 inch.
   4. Panel Edge: Square.
   5. Color: White.
   6. Suspension System: Exposed grid.

C. Acoustical Panels: Mineral fiber with Vinyl-face membrane, with the following characteristics:
   1. Classification: ASTM E1264 Type III.
      a. Form: Wet-Formed .
      b. Pattern: "G" - smooth.
   2. Size: 24 by 48 inches.
   3. Thickness: 5/8 inch.
   4. Panel Edge: Square.
   5. Color: White.
   6. Suspension System Type _____: Exposed grid.

2.02 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Armstrong World Industries, Inc; Product See Drawing A 3.1: www.armstrong.com.
   2. Chicago Metallic Corporation: www.chicagometallic.com.
   3. Hunter Douglas Contract: www.hunterdouglascontract.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

D. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.

E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

F. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

G. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions as indicated.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

I. Install hold-down clips on panels within 20 ft of an exterior door.

J. Install safety clips on wood veneer panels 2 inches from outside edge of panel and at 24 inches on center.
   1. Use wire ties to attach safety clips.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.05 CLEANING

A. Clean surfaces.

B. Replace damaged or abraded components.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base.

1.02 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.

B. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for JHS Architects's initial selection.

D. Concrete Testing Standard: Submit a copy of ASTM F710.

E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Wall Base: 200 linear feet of each type and color.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 SHEET FLOORING

2.02 RESILIENT BASE

A. Resilient Base and Stair Nosing: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Manufacturers:

a. Burke Flooring: www.burkeflooring.com/#sle.
b. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
c. Roppe Corp: www.roppe.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
3. Height: 4 inch.
4. Thickness: 0.125 inch.
5. Finish: Satin.
6. Length: Roll.
7. Color: Black.
8. Color: Color as selected from manufacturer's standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

3.02 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.03 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.04 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 6813
CARPET TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

B. Removal of existing carpet tile and resilient base.

1.02 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).

B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum 10 years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum five years documented experience and approved by carpet tile manufacturer.

1.05 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Standard Basis of Design:
   1. Interface, Inc: www.interface.com/#sle.
   2. Mohawk Group: www.mohawkgroup.com/#sle.

B. Acceptable Manufacturers:
   1. Milliken & Company; ____: www.milliken.com/#sle.

2. Patcraft
3. Substitutions: Prebid approved equal.

2.02 MATERIALS

A. Tile Carpeting: Interface Cartera; Style: Mesa, Tufted Textured Loop

Style: Backbeat, Tufted, manufactured in one color dye lot.

1. Tile Size: 19.7 by 19.7 inch, nominal.
2. Color: Mesa.
3. Dye Method: 100% Solution Dyed
4. Pattern: Quater-turn.
5. Yarn System: Post Consumer Content Nylon
6. Tufted Face Weight: 18 oz / yd x 2
7. Gage: 1/12 inch.
8. Stitches: 10.00 per inch.
9. Finished Pile Height: 0.15"
10. Primary Backing Material: GlasBac.

B. Walk-Off Modular Tile: Mohawk Tuff Stuff II Style: First Step II (GT315)

1. Tile Size: 24 by 24 inch. nominal
2. Color: Walnut 859
3. Backing: EcoFlex NXT
4. Pattern: Quater-turn
5. Fiber Type: Duracolor Premium Nylon (L07)
6. Stitches per inch: 8.5
7. Tufted Pile Weight: 38.0 oz/yd2

2.03 ACCESSORIES

A. Edge Strips: Embossed aluminum, color as selected by Architect.

B. Adhesives:

1. Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) .

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).

1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

A. Prepare floor substrates and base as recommended by flooring and adhesive manufacturers. Cut around stacks as shown on drawings. Carpet under stacks shall remain.

B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.

C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.
B. Install carpet tile in accordance with manufacturer's instructions.
C. Blend carpet from different cartons to ensure minimal variation in color match.
D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
E. Lay carpet tile in monolithic pattern, set parallel to building lines.
F. Fully adhere carpet tile to substrate.
G. Trim carpet tile neatly at walls and around interruptions.
H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 7720

FIBERGLASS REINFORCED WALL PANELS

PART 1 –GENERAL

SUMMARY

2.01 SECTION INCLUDES: PREFINISHED POLYESTER GLASS REINFORCED PLASTIC SHEETS AND ADHERED TO UNFINISHED GYPSUM WALLBOARD.

A. RELATED SECTIONS
1. Section 09 2116 Gypsum Board Assemblies
2. Section 09 9000 Paint and Coating

B. REFERENCES
1. American Society for Testing and Materials: Standard Specifications (ASTM)
   a. ASTM D 256 -Izod Impact Strengths (ft #/in)
   b. ASTM D 570 -Water Absorption (%)
   c. ASTM D 638 -Tensile Strengths (psi) & Tensile Modulus (psi)
   d. ASTM D 790 -Flexural Strengths (psi) & Flexural Modulus (psi)
   e. ASTM D 2583-Barcol Hardness
   f. ASTM D 5319 -Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
   g. ASTM E 84 -Standard Test Method for Surface Burning Characteristics of Building Materials.

C. SUBMITTALS
1. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
   a. Preparation instructions and recommendations.
   b. Storage and handling requirements and recommendations.
   c. Installation methods.
2. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
3. Selection Samples: Submit manufacturer’s standard color pattern selection samples representing manufacturer's full range of available colors and patterns. -

D. QUALITY ASSURANCE
1. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
   a. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
      1) Wall Required Rating – Class A
   b. Sanitary Standards: System components and finishes to comply with:
      1) United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
      2) Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

E. DELIVERY, STORAGE AND HANDLING
1. Deliver materials factory packaged on strong pallets.
2. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

F. PROJECT CONDITIONS
1. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
2. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
   a. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

G. WARRANTY
   1. Furnish one year guarantee against defects in material and workmanship.

H. PRODUCTS

I. PANELS
   1. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
      a. Coating: Multi-layer print, primer and finish coats or applied over-layer.
      b. Dimensions:
         1) Thickness – 0.090 “ nominal
         2) Width - 4'-0” nominal
         3) Length – 10’-0” nominal
         4) Tolerance:
         5) Length and Width: +/-1/8 “
         6) Square -Not to exceed 5/32“ for 10 foot panels
   2. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
      a. Flexural Strength -1.0 x 104 psi per ASTM D 790.
      b. Flexural Modulus -3.1 x 105 psi per ASTM D 790.
      c. Tensile Strength -7.0 x 103 psi per ASTM D 638.
      d. Tensile Modulus -1.6 x 105 psi per ASTM D 638.
      e. Water Absorption -0.72% per ASTM D 570.
      f. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
      g. Izod Impact Strength of 72 ft. lbs./in ASTM D 256
   3. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
      a. Color and Finish:
         1) To be selected form manufacturers standard color and finish selections.
         2) Size: 48” x 120” x .090” nom.

J. MOLDINGS
   1. PVC Trim: Thin-wall semi-rigid extruded PVC.
      a. Inside Corner, 10’ length
      b. Outside Corner, 10’ length
      c. Division, 10’ length
      d. Edge, 10’ length
      e. 135° Inside Corner 8’ length
      f. 135° Outside Corner 8’ length
      g. Color: Color selected from manufacturers standard range

K. Outside Corner Guard:
   1. Stainless Corner Guard, 10’ length-To be installed 6’ A.F.F. at all outside corners
   2. Finish: #4 brushed satin

L. ACCESSORIES
   1. Fasteners: Non-staining nylon drive rivets.
      a. Match panel colors.
      b. Length to suit project conditions.
   2. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
      a. FRP Adhesive -Water-resistant, non-flammable adhesive.
      b. Construction Adhesive -Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.
      c. Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive.
   3. Sealant:
      a. Clear Silicone Sealant.
      b. White Silicone Sealant.

c. Color Match Sealant.

M. EXECUTION

N. PREPARATION

1. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
   a. Verify that stud spacing does not exceed 24” (61cm) on-center.
2. Repair defects prior to installation.
   a. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

O. INSTALLATION

1. Comply with manufacturer's recommended procedures and installation sequence.
2. Cut sheets to meet supports allowing 1/8” (3 mm) clearance for every 8 foot (2.4m) of panel.
   a. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
   b. Pre-drill fastener holes 1/8” (3mm) oversize with high speed drill bit.
      1) Space at 8” (200mm) maximum on center at perimeter, approximately 1” from panel edge.
      2) Space at in field in rows 16’ (40.64cm) on center, with fasteners spaced at 12” (30.48 cm) maximum on center.
3. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
   a. Install panels with manufacturer's recommended gap for panel field and corner joints.
      1) Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
      2) Drive fasteners for snug fit. Do not over-tighten.
4. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
   a. All moldings must provide for a minimum 1/8 “ (3mm) of panel expansion at joints and edges, to insure proper installation.
   b. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

P. CLEANING

1. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
2. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Exterior Scope: Finish all exterior surfaces exposed to view, **unless fully factory-finished** and unless otherwise indicated, including the following:
   1. Steel bollards. See locations & details on architectural site plan drawings.
   2. Pavement markings including Handicap Symbols.
   3. Hollow Metal door frames and doors.

D. Interior Scope: Finish all surfaces exposed to view, **unless fully factory-finished** and as scheduled in Finish Schedule, including the following:
   1. Misc Metal fabrications.
   2. Hollow metal door frames and doors.

E. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Floors, unless specifically so indicated.
   5. Glass.
   6. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Sec tion 055000 - Metal Fabrications: Shop-primed items.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
   1. Exterior Surfaces for Opaque Finish, Normal Environment.

C. **MASTER PAINTERS INSTITUTE (MPI)**
   1. Exterior Coatings
      a. MPI 97 (2005) Latex Traffic Marking Paint
      b. MPI 101(2004) Cold Curing Epoxy Primer
      c. MPI 108(2004) High Build Epoxy Marine Coating
      d. MPI 151 (2005) Waterborne, Light Industrial Coating
   2. Interior Coatings
      a. MPI 39(2004) Interior Latex-based Wood Primer
      b. MPI 50(2004) Interior Latex Primer Sealer
      c. MPI 57(2004) Interior Oil Modified Clear Urethane, Satin
      d. MPI 77(2004) Epoxy Cold Cured, Gloss
      e. MPI 79(2004) Marine Alkyd Metal Primer
      f. MPI 110(2004) W.B. Light Industrial Coating
      g. MPI 139(2004) High Performance Latex, White and Tints - MPI Gloss Level 3

h. MPI 140(2004) High Performance Architectural Latex - Gloss Level 4
i. MPI 141(2004) High Performance Semigloss Latex, White and Tint - Gloss Level 5

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

B. MPI System Number: The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

C. MPI Gloss Levels:
1. MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.
2. Gloss levels are defined by MPI as follows:
a. Gloss Level Description Units Units
b. @ 60 degrees @ 85 degrees
c. G1 Matte or Flat 0 to 5 10 max
d. G2 Velvet 0 to 10 10 to 35
e. G3 Eggshell 10 to 25 10 to 35
f. G4 Satin 20 to 35 35 min
g. G5 Semi-Gloss 35 to 70
h. G6 Gloss 70 to 85
i. G7 High Gloss
3. Gloss is tested in accordance with ASTM D 523.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
2. Allow 30 days for approval process, after receipt of complete samples by JHS Architects.

D. Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

E. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 12 x 12 inch in size.

F. Manufacturer's Instructions: Indicate special surface preparation procedures.

G. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.06 QUALITY ASSURANCE

A. The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and

each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

B. MPI "Approved Product List" shall, for purposes of this specification, mean the products to be considered approved must be qualified under the MPI "Detailed Performance" or MPI " Evaluated Performance" definitions.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

D. Applicator Qualifications: Company specializing in performing the work of this section five years documented experience and approved by manufacturer and approved by manufacturer. Submit the following information concerning the applicator.

E. Samples of specified materials may be taken and tested for compliance with specification requirements.

F. Sampling Procedure: If indicated, the Architect or Owner's Project Representive may select a product at random from the products that have been delivered to the job site. The Contractor shall provide one liter(one quart) samples of the selected paint materials. The samples shall be taken in the presence of the Architect or designated testing agent, and labeled, identifying each sample. Provide appropriate labels.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

B. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

C. Chromate Content: Do not use coatings containing zinc-chromate or strontium-chromate.

D. Asbestos Content: Materials shall not contain asbestos.

E. Mercury Content: Materials shall not contain mercury or mercury compounds.

F. Silica: Abrasive blast media shall not contain free crystilline silica.

G. Human Carcinogens: Materials shall not contain ACGIH TLV-BKLT and ACGIH TLV-DOC confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.08 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 12 feet long by 7 feet wide, illustrating filler and finish coating color, texture, and finish for interior concrete painted walls.

C. Locate where directed.

D. Mock-up may remain as part of the work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.11 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Supply 1 gallon of each color; store where directed.

C. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by JHS Architects is obtained using the specified procedures for substitutions.
   2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.

C.
   1. Base Manufacturer: Any Manufacture listed in the specified MPI system which are members or Master Paint Institute (MPI)..
   2. The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

D. Manufacturers - Field-Catalyzed Coatings:
   1. Base Manufacturer: Any Manufacture listed in the specified MPI system which are members or Master Paint Institute (MPI).

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each coating material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:

1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

D. Colors: To be selected from manufacturer's full range of available colors.

2.03 PAINT SYSTEMS - EXTERIOR

A. **PAVEMENT MARKING**
   1. **Bituminous Paving and Parking**
      a. (New Bituminous Pavements which are dry and clean.)
         1) **MPI EXT 2.1B Latex Traffic Marking Paint**
            Primer: Intermediate: Topcoat:
            (a) N/A N/A MPI 97
            (b) One coat, Yellow with reflective particles, 4 inches wide.
            (c) Total finished thickness: 7 mils minimum.

B. **STEEL / FERROUS**
   1. **New steel** blast cleaned to SSPC SP 10.
      a. **Waterborne Light Industrial:**
         1) **MPI EXT 5.1R-G6 (Gloss)**
            (a) Primer: Intermediate: Topcoat:
            (b) MPI 101 MPI 108 MPI 151-G3
            (c) System DFT: (8.5 mils) 212 microns

2.04 PAINT SYSTEMS - INTERIOR

A. **STEEL, INTERIOR FERROUS & NON-FERROUS**
   1. **Steel, Metal;** Ferrous & Non-Ferrous such as door frames.
      a. Waterborne Light Industrial
         1) **MPI INT 5.1R-G35 (SemiGloss)**
            Primer: Intermediate: Topcoat:
            (a) MPI 79 MPI 139 MPI 139
            (b) System DFT: ((5 mils) 125 microns)
         2) **MPI EXT 5.1C-G5 (SemiGloss) (Unprimed Steel)**
            (a) Sandblast existing steel to remove rust and loose paint. Prepare to SP2/SP3.
            (b) EXT system used due to damp enviroment, earth floor and animals.
            Primer: Intermediate: Topcoat:
            (c) MPI 79 MPI 110 MPI 110 - G3
            (d) System DFT: ((5 mils) 125 microns)

B. **WOOD, INTERIOR**
   1. **New Wood and plywood** not otherwise specified: (Mezzinine Plywood Floor)
      a. **High Performance Architectural Latex**
         1) **MPI INT 6.4S-G5 (Semigloss)**
            (a) Primer: Intermediate: Topcoat:
            (b) MPI 39 MPI 141 MPI 141
            (c) System DFT: (4.5 mils) 112 microns
   2. **New natural finish wood:** (Hardwood Base Chair rail & coor / window casings.)
      a. **Natural finish, oil-modified polyurethane**
         1) **New; MPI INT 6.4J-G4**
            (a) Primer: Intermediate: Topcoat:
            (b) MPI 57 MPI 57 MPI 57
            (c) System DFT: (4 mils) 100 microns

C. **GYPSUM DRYWALL & PLASTER**
   1. **New Wallboard:**
      a. **High Performance Architectural Latex**
         1) **Epoxy [Finish Schedule - PT02]**
            (a) **MPI INT 9.2F-G5 (SemiGloss)**
               Primer: Intermediate: Topcoat:
               (1) MPI 50 MPI 77 MPI 77
               (2) System DFT: (4 mils) 100 microns

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

A. Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.02 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Concrete Floors and Traffic Surfaces: 8 percent.

3.03 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
   1. Surface Cleaning: Plaster and stucco shall be clean and free from loose matter; gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.
   2. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.
   3. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D 4263. New plaster to be coated shall have a maximum moisture content of 8 percent, when measured in accordance with ASTM D 4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.
   4. Fill minor defects with filler compound. Spot prime defects after repair.

G. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
   1. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to [SSPC SP 2], [SSPC SP 3], [SSPC SP 6], or [SSPC SP 10]. [Brush-off blast remaining surface in accordance with SSPC SP 7]; [Water jetting to SSPC SP 12 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting.] Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.
   2. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with [SSPC SP 6/SSPC SP 12 WJ-3][SSPC SP 10/SSPC SP 12 WJ-2].

H. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

I. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.04 APPLICATION

A. Coating Application
   1. Apply products in accordance with manufacturer's instructions.
   2. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

3. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.
4. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.
5. Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.
6. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.
7. Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.
8. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
9. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
10. Apply each coat to uniform appearance.

B. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
   1. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.
   2. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.
   3. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

C. Mixing and Thinning of Paints
   1. Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.
   2. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

D. Two-Component Systems
   1. Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

E. Coating Systems
   1. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 0.038 mm(1.5 mil) each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
   2. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

F. Coating Systems for Metal

1. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
2. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.
3. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
4. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 0.038 mm(1.5 mils) DFT immediately prior to application of epoxy or urethane coatings.
5. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

B. the Owner will provide field inspection.

3.06 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 SCHEDULE - PAINT SYSTEMS

A. Gypsum Board: Finish all surfaces exposed to view.
   1. Interior Walls: MPI INT 9.2F - G5, (SemiGloss).

B. Steel Doors and Frames: Finish all surfaces exposed to view: MPI EXT 5.1R -G6, (Gloss).

   MPE INT 5.1R - G5 (SemiGloss)

C. Steel Fabrications: Finish all surfaces exposed to view.
   1. Exterior: MPI EXT 5.1R - G6 , (Gloss).
   2. Interior: MPI INT 5.1N - G5, (Semi-gloss).
      a. Special Coating - at bottom 10 inches of steel embeds per Article 1.01 D.4.a above.

D. Hardwood Casings, Trim & Base: Transparent Finish
   1. MPI INT 6.4J - G4

E. Softwood Opaque Finish::
   1. MPI INT 6.4S - G5

F. Exterior Pavement Markings: See site plans for parking stripping & Handicap symbols.
   1. Exterior: MPI EXT 2.1 B

END OF SECTION

SECTION 10 1100
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Porcelain enamel steel markerboards.

B. Markerboards.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

1.03 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. ANSI A208.1 - American National Standard for Particleboard; 2009.

C. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a (Reapproved 2016).

D. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on chalkboard, markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

D. Samples: Submit two samples 2 by 2 inch in size illustrating materials and finish, color and texture of chalkboard, markerboard, tackboard, tackboard surfacing, and trim.

E. Manufacturer's printed installation instructions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Visual Display Boards:
   1. MooreCo, Inc: www.moorecoinc.com.
   2. Claridge Products and Equipment, Inc: www.claridgeproducts.com/#sle.
   3. Polyvision Corporation (Nelson Adams): www.polyvision.com/#sle.
   4. Best-Rite Chalkobard Co.
   5. ADP/Lemco, Inc.

2.02 VISUAL DISPLAY UNITS

A. Markerboards: Porcelain enamel on steel, laminated to core.
   1. Manufacturers:
      a. Substitutions: See Section 01 6000 - Product Requirements.
   2. Color: White.
   3. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
   4. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
   5. Backing: Aluminum foil, laminated to core.
   6. Size: As indicated on drawings.
   7. Height: 48 inches.
   8. Length: 10 feet, in one piece.
   9. Frame: Extruded aluminum, with concealed fasteners.
   10. Frame Finish: Anodized, natural.
   11. Accessories: Provide marker tray and map rail.

2.03 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.

C. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

D. Aluminum Sheet Backing: 27 gage, 0.014 inch thick.

E. Adhesives: Type used by manufacturer.

2.04 ACCESSORIES

A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.

B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

C. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.

D. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

C. Verify flat wall surface for frameless adhesive-applied boards.

3.02 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Install with top of chalk tray at 30 inches above finished floor unless shown otherwise..

C. Secure units level and plumb.

3.03 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

3.04 SCHEDULE - SEE DRAWINGS FOR SIZES

END OF SECTION

SECTION 10 1400
PLASTIC SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room signs.

1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from the Owner through JHS Architects at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by the Owner through JHS Architects prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Verification Samples: Submit samples showing colors specified.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

1.06 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flat Signs:
   1. Best Sign Systems, Inc: www.bestsigns.com/#sle.
   2. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.
   3. Seton Identification Products: www.seton.com/aec/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Sign Height: 2 inches, unless otherwise indicated.
   5. Office Doors: room names and numbers to be determined later, not those indicated on drawings.
   6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings.
   7. Classrooms: Identify with room numbers to be determined later, not the numbers indicated on drawings.
   8. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
   9. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

2.03 SIGN TYPES

A. Flat Signs: Signage media without frame.
   1. Edges: Square.
   2. Corners: Radiused.
   3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: Clear.
   4. Character Color: Contrasting color.

2.04 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
   1. Total Thickness: 1/16 inch.

2.05 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Request wall installed or door installed.

B. Install in accordance with manufacturer's instructions.

C. Install neatly, with horizontal edges level.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 2600
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

B. Surface applied wall protection sheet.

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Wall construction.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Protective Wall and Corner Guards:
   1. Construction Specialties, Inc; SSM-20 Corner Guard: www.c-sgroup.com/#sle.
   2. Inpro; 150 Series Corner Guard: www.inprocorp.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PRODUCT TYPES

A. Corner Guards - Surface Mounted:
   1. Material: High impact vinyl with full height extruded aluminum retainer.
   2. Width of Wings: 2 inches.
   3. Corner: Square.
   4. Color: As indicated on the Finish Schedule.
   5. Length: One piece. Corner Guards are to extend from the top of the wall base to a height of 4 feet and 4 inches above finished floor.
   6. Preformed end caps.

B. Wall Guards - Surface Mounted, High impact vinyl sheet fully adhered to wall surface.
   1. Size: Wall guard material is to extend up the wall to the heights indicated on the drawings.
   2. Color: As selected.
   3. Thickness: 0.040 inch.
   4. Length: Provide wall guard material in longest lengths possible.
   5. Location: Where shown on Room Finish Schedule.
   6. Provide top trim and other needed items of same color as wall guard material.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

END OF SECTION

SECTION 10 2800
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1999 (Reapproved 2009).

C. ASTM A 167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1994a.

D. ASTM C1036 - Standard Specification for Flat Glass; 2011.

E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Toilet Accessories:
   1. A & J Washroom Accessories Inc: www.ajwashroom.com.
   2. American Specialties, Inc: www.americanspecialties.com.
   3. Bradley Corporation: www.bradleycorp.com.
   4. Bobrick Washroom Equipment, Inc.
   5. American Accessories, Inc: www.aaiusaonline.com
   6. Substitutions: Section 01 6000 - Product Requirements.

B. All items of each type to be made by the same manufacturer.

C. Mirrors: Mirrors are shown on drawings, not in the drawings schedule.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

C. Adhesive: Two component epoxy type, waterproof.

D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, if item is not available in nickel plated.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Double roll, semi-recessed, stainless steel unit .
   1. Products:
      a. Bobrick "B-357"
      b. Substitutions: Section 01 6000 - Product Requirements.

B. Paper Towel Dispenser: Folded paper type, stainless steel, semi-recessed.
   1. Products: Bobrick B-43944
      a. Substitutions: Section 01 6000 - Product Requirements.

C. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Size: As indicated on drawings.
   2. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
   3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
   4. Shelf: Stainless steel; gage and finish to match mirror frame, turned down edges, welded to frame; 5 inches deep, full width of mirror.

D. Robe Hooks: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish. (Mount at 5'-4" above finish floor.)

E. Shower Rod: Stainless steel, satin finish.
   1. Products: Bobrick B-6107
   2. Length and Configuration: As indicated on drawings.

F. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
   1. Length: 36 inches, 42 inches, and 18 inches

G. Combination Sanitary Napkin Dispenser: _____, semi-recessed.
   1. Products: Bobrick B-43500
      a. Substitutions: Section 01 6000 - Product Requirements.

H. Sanitary Napkin Disposal Unit: Stainless steel____.
   1. Products: Bobrick B-270
      a. Substitutions: Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.03 SCHEDULE

A. Restroom 104, 113,144B, and 154
- 1- 24"x36" Mirror
- 1 - 36" Grab Bar
- 1 - 42" Grab Bar
- 1 - 18" Grab Bar
- 1 - Toilet Paper Dispenser
- 1 - Sanitary Napkin Dispenser
- 1 - Sanitary Napkin Disposal
- 1 - Paper Towel Dispenser

B. Restroom 114 and 155
- 1- 24"x36" Mirror
- 1 - 36" Grab Bar
- 1 - 42" Grab Bar
- 1 - 18" Grab Bar
- 1 - Toilet Paper Dispenser
- 1 - Paper Towel Dispenser

C. Restroom 144D
- 1- 24"x36" Mirror
- 1 - 36" Grab Bar
- 1 - 42" Grab Bar
- 1 - 18" Grab Bar
- 1 - Toilet Paper Dispenser
- 1 - Sanitary Napkin Dispenser
- 1 - Sanitary Napkin Disposal
- 1 - Paper Towel Dispenser
- 1 - Robe Hooks
- 1 - Shower Rod

END OF SECTION

SECTION 10 2823
LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Built-In Ironing Boards

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Placement of wood blocking, steel sheet blocking, and backing plates in stud wall construction for attachment of accessories.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work with the placement of internal wall reinforcement to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: Iron-A-Way, LLC: www.ironaway.com

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BUILT-IN IRONING BOARDS

A. Built-in Ironing Boards: Recessed electric ironing center, meeting or exceeding ASTM F2285.
   1. Mounting: As indicated in product listing.
   2. Products:
      a. Model E-42 - Recessed - Deluxe Fixed Position Electric Ironing Center
         1) Product Dimensions: 52"H x 15"W x 7 3/4"D
         2) Rough-In Opening: 51 1/4"H x 14 3/8"W x 3 7/8"D
         3) Electrical Requirements: 115/120v, 15 amp
      b. Substitutions: 01 6000 - Product Requirements.

2.03 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

2.04 FINISHES

A. Cabinet Box: Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.

B. Cabinet Frame and Door: Unfinshed maple veneer

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 3500
FLAGPOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes ground-set, fixed, cone tapered flagpoles with integral lighting system and internal halyard flagpoles made from aluminum.

1.02 DESIGN / PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001 , "Guide Specifications for Design of Metal Flagpoles."

1.03 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product data and installation instructions for each type of flagpole required

C. Shop drawings of flagpoles and bases, showing general layout, jointing, grounding method, and anchoring and supporting systems.
   1. Include details of foundation system for ground-set poles.

1.04 QUALITY ASSURANCE

A. Manufacturing Standards: Provide each flagpole as a complete unit produced by a single manufacturer, including fittings, accessories, bases, and anchorage devices.

B. Design Criteria: Provide flagpoles and installations constructed to withstand a 90 mph ((145 km/h)) wind velocity minimum when flying flag of appropriate size. Use heavy pipe sizes if required for flagpole type and height shown.

C. Pole Construction: Construct pole and ship to site in one piece if possible. If more than one piece is necessary, provide snug-fitting, precision joints with self-aligning, internal splicing sleeve arrangement for weather-tight, hairline field joints

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy Kraft paper or other weather-tight wrapping and prepare for shipment in hard fiber tube or other protective container.

B. Deliver flagpoles and accessories completely identified for installation procedure. Handle and store flagpoles to prevent damage or soiling.

PART 2 PRODUCTS

2.01 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

B. Exposed Height:
   1. (1) 30 feet (9.1 m)
   2. (2) 25 feet (7.6 m)

C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/ (B 241 M), Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, Temper T6.

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.064-inch- (1.6-mm-) minimum nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole. Provide flashing collar of same material and finish as flagpole.

2.02 ACCESSORIES

A. Finial Ball: American Beacon- Internal Revolving-winch by American Flagpole or approved equal. 965700045, 110V, Silver, 6 Watt L.E.D. Finial Ball/ Flagpole lighting system.

B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

C. Halyard Flag Snaps: Provide two swivel snap hooks per halyard.

D. Elastomeric Joint Sealant: Single-component urethane or single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (non-traffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

E. Truck: Ball-bearing, non-fouling, revolving, double-track assembly of cast metal finished to match pole shaft.

F. Cleats: Two 9 inch ((225 mm)) cast metal cleats with fasteners, finished to match pole shaft.

G. Halyards: Provide two continuous halyards for each flagpole, as follows:
   1. Nylon, braided, with metal core.
   2. Size: 5/16 inch (No. 10) ((8 mm)).

H. Internal Halyard System: Furnish pole with internal halyard system consisting of a manually operated, geared winch with control stop device and removable handle. Provide stainless steel braided aircraft-type cable and concealed revolving truck assembly with plastic-coated counter balance and sling. Provide reinforced, flush access door, secured with cylinder lock.

I. Integral Lighting System. American Beacon/ Finial Ball Lighting System mounted as per manufacturer's recommendations

2.03 FINISHES

A. Aluminum: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 EXECUTION

3.01 PREPARATION FOR GROUND-SET POLES

A. Excavation: Excavate for foundation concrete to neat clean lines in undisturbed soil. Provide forms where required due to unstable soil conditions. Remove wood, loose soil, rubbish, and other foreign matter from excavation; and moisten earth before placing concrete. Back fill open excavation after concreting with original excavated material.

B. Concrete: Provide concrete composed of portland cement, coarse and fine aggregate, and water mixed in proportions to attain 28-day compressive strength of not less than 3000 psi ((20 MPa)), complying with ASTM C 94.

C. Place concrete immediately after mixing. Compact concrete in place by use of vibrators. Moist-cure exposed concrete for not less than 7 days, or use a non-staining curing compound in cold weather.

D. Finish trowel exposed concrete surfaces to smooth, dense surface. Provide positive slope for water runoff to base perimeter.

3.02 INSTALLATION

A. General: Prepare and install flagpoles where shown and in compliance with accepted shop drawings and manufacturer's instructions.
   1. Provide positive lightning ground for each flagpole installation.

2. Paint below-grade portions of ground-set flagpole with heavy coat of bituminous paint.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Fire extinguishers per Schedule at end of this Section.
B. Fire extinguisher cabinets per Schedule at end of this Section.
C. Accessories.

1.02 RELATED REQUIREMENTS
A. Section 06100 - Rough Framing: Roughed-in & blocking at wall openings.
B. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS
A. FM (AG) - FM Approval Guide; current edition.
B. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 PERFORMANCE REQUIREMENTS
A. Conform to NFPA 10.
B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide extinguisher operational features.
C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.06 FIELD CONDITIONS
A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 FIRE EXTINGUISHERS
A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
B. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
   1. Class 2A.
   2. Size 20B:C.
   3. Size and classification as scheduled.

4. Finish: Polished chrome at Office Building.
5. Finish: Baked enamel, Red color at SallyPort locations.

2.02 FIRE EXTINGUISHER CABINETS

A. Metal: Formed primed steel sheet; 0.036 inch thick base metal.

B. Cabinet Configuration: Recessed type.
   1. Size to accommodate accessories.
   2. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.

D. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.

E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

F. Weld, fill, and grind components smooth.

G. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.

H. Finish of Cabinet Interior: White colored enamel.

2.03 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, ____ inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

3.03 FIRE EXTINGUISHER SCHEDULE - LOCATE AS SHOWN ON ARCHITECTURAL PLAN TO BE ISSUED PRIOR TO CONSTRUCTION.

A. Within Semi-Recessed Cabinet.

END OF SECTION

SECTION 10 5113
METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lockers - 28 Double Tier.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - CAST-IN-PLACE CONCRETE: Concrete base construction.

B. Section 06 1000 - Rough Carpentry: Wood base construction.

C. Section 06 1000 - Rough Carpentry: Wood blocking and nailers.

D. Section 06 2000 - Finish Carpentry: Bench tops for locker bench support brackets.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.

C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.

D. Full Size Sample: One full-size locker of each construction specified for evaluation of construction.

E. Samples: Submit two samples 4 by 4 inches in size showing color and finish of metal locker material.
   1. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Lockers:
   1. Art Metal Products: www.artmetalproducts.com/#sle.
   2. List Industries, Inc: www.listindustries.com/#sle.
   3. Lockers MFG: www.lockersmfg.com/#sle.
   4. Lyon Workspace Products: www.lyonworkspace.com/#sle.
   5. Penco Products, Inc: www.pencoproducts.com/#sle.
   6. Republic Storage Systems Co: www.republicstorage.com/#sle.
   7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LOCKER APPLICATIONS

A. Student Lockers: Metal lockers, recessed mounted.
   1. Width: 15 inches.
   2. Depth: 15 inches.
   3. Height: 72 inches.
   4. Configuration: Two tier.
   5. Fittings: Size and configuration as indicated on drawings.
      a. Hat shelf.
      b. Single shoe shelf.
      c. Coat rod.
      d. Hooks: One single prong.
   6. Ventilation: Louvers at top and bottom of door panel.
   7. Locking: Built-in combination locks.
   8. Provide sloped top.

2.03 METAL LOCKERS

A. Accessibility: Comply with ICC A117.1 and ADA Standards.

B. Locker Case Construction:

C. Lockers: Factory assembled, made of formed sheet steel, 1 SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
   1. Where ends or sides are exposed, provide flush panel closures.
   2. Provide filler strips where indicated, securely attached to lockers.
   3. Color: To be selected by JHS Architects.

D. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
   1. Body and Shelves: 24 gage, 0.0239 inch.
   2. Base: 20 gage, 0.036 inch.
   3. Metal Base Height: 4 inch.

E. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
   1. Door Frame: 16 gage, 0.0598 inch, minimum.

F. Doors: Channel edge; welded construction, manufacturer's standard stiffeners, grind and finish edges smooth.
   1. Door Thickness: 16 gage, 0.0598 inch, minimum.
   2. Form recess for operating handle and locking device.

G. Doors: Hollow double pan, sandwich construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
   1. Door Outer Face: 18 gage, 0.0478 inch, minimum.
   2. Door Inner Face: 20 gage, 0.0359 inch, minimum.
   3. Form recess for operating handle and locking device.

H. Latches and Door Handles: Manufacturer's standard.

I. Hinges: Continuous piano hinge with powder coat finish to match locker color.

J. Trim: 20 gage, 0.0359 inch.

K. Coat Hooks: Stainless steel or zinc-plated steel.

L. Number Plates: Provide oval shaped aluminum plates. Form numbers ____ inch high of block font style with ADA designation, in contrasting color.

M. Locks: Locker manufacturer's standard type indicated above.

N. Built-In Lock Boxes: Same material as locker, manufacturer's standard size, with padlock hasps, for padlocks provided by Owner.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.

B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Place and secure on prepared base.

C. Install lockers plumb and square.

D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.

E. Bolt adjoining locker units together to provide rigid installation.

F. Install end panels, filler panels, and sloped tops.

G. Install fittings if not factory installed.

H. Replace components that do not operate smoothly.

3.03 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 21 1300
FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. Deluge sprinkler system.

C. Preaction sprinkler system.

D. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

A. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

B. Section 22 0553 - Identification for Plumbing Piping and Equipment.

C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

D. Section 28 4600 - Fire Detection and Alarm.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; current edition.

B. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

C. ITS (DIR) - Directory of Listed Products; current edition.

D. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.

E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:
   1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
   2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
   3. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to JHS Architects.

D. Manufacturer's Qualification Statement.

E. Installer's Qualification Statement.

F. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

G. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
   3. Sprinkler Wrenches: For each sprinkler type.

1.06 QUALITY ASSURANCE

A. Maintain one copy of referenced design and installation standard on site.

B. Comply with FM (AG) requirements.

C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Idaho.

D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

E. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience and approved by manufacturer.

F. Equipment and Components: Provide products that bear FM (AG) label or marking.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.07 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:
   1. Tyco Fire Protection Products; _____: www.tyco-fire.com/#sle.
   2. Viking Corporation; _____: www.vikinggroupinc.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for entire building.

B. Occupancy: Light hazard; comply with NFPA 13.

C. Water Supply: Determine volume and pressure from water flow test data.

D. Interface system with building control system.

E. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

F. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Manufacturers:
      a. Powers Fasteners, Inc; _____ www.powers.com/#sle.

2.03 SPRINKLERS

A. Suspended Ceiling Type: Semi-recessed pendant type with matching push on escutcheon plate.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Escutcheon Plate Finish: Antique Brass.
   4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

B. Exposed Area Type: Pendant type with guard.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

C. Storage Sprinklers: Pendant type with guard.
   1. Response Type: Standard.
   2. Coverage Type: Standard.

3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

D. Spray Nozzles: Brass with solid cone discharge, 30 degrees of arc with blow-off dust cap.

2.04 SPRINKLERS

2.05 PIPING SPECIALTIES

A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
   1. Activate electric alarm.
   2. Test and drain valve.
   3. Replaceable internal components without removing valve from installed position.
   4. Manufacturers:
      a. Victaulic Company; Series 751 with Series 760 motor alarm: www.victaulic.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Flooding Deluge Valve: Gate type valve with rubber faced disc actuated manually with water motor alarm and electric alarm, with alarm testing trim.

C. Preaction Valve:
   1. Operated by detection system listed for releasing service and independent of building fire alarm system with provisions for local, manual, and indicated remote releases.
   2. Incorporate mechanical latching mechanism incorporating valve clappers independent of system water pressure fluctuations.
   3. Provide test detection device for each actuation circuit adjacent to each controlled valve in accordance with NFPA 13.

D. Test Connections:
   1. Inspector's Test Connection for Preaction Systems:
      a. Provide test connections approximately 6 ft above floor for each or portion of each sprinkler system equipped with an alarm device, located at the most remote part of each system.
      b. Route test connection to an open-site drain location, excluding janitor sinks, accepting full flow without negative consequences.
      c. Supply discharge orifice with same size as corresponding sprinkler orifice.
      d. Limit vertical height of exterior wall penetration to 2 ft above finished grade.

E. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy chrome plated gong and motor housing, nylon bearings, and inlet strainer.

F. Electric Alarm: Electrically operated chrome plated gong with pressure alarm switch.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Locate outside alarm gong on building wall as indicated.

D. Place pipe runs to minimize obstruction to other work.

E. Place piping in concealed spaces above finished ceilings.

F. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

I. Require test be witnessed by Fire Marshal.

END OF SECTION

DIVISION 21: FIRE SUPPRESSION

END TABLE OF CONTENTS

SECTION 210500 - COMMON REQUIREMENTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe, fittings, valves, and connections for sprinkler systems.

1.2 SUMMARY

A. Modify, furnish, and install an automatic fire sprinkler protection system as described in Contract Documents.
   1. The existing system shall be modified as shown and work shall include but not necessarily be limited to the following areas:
      a. Tenant Improvement areas.
      b. Building addition.
   2. It is mandatory that a site visit be made to inspect existing conditions before submitting bid.

1.3 RELATED REQUIREMENTS

A. Section 09 9123 - Painting: Preparation and painting of fire protection piping systems.

B. Section 21 1300 - Wet Pipe Fire Suppression Sprinklers: Sprinkler systems design.

1.4 REFERENCE STANDARDS

A. ASTM A 795/A 795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2008.

B. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2010.

C. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2010.

D. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

E. UL 262 - Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

F. UL 312 - Check Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.5 APPLICABLE CODES AND ORDINANCES

A. The following form a part of this specification:
   1. National Fire Protection Association Pamphlets: Standards of the National Fire Protection Association for the Installation of Sprinkler and Fire Protection Equipment.
      a. Pamphlet No. 13, 13D, 13R, 14, and applicable standards.
      b. Pamphlet No. 231, 231C and applicable standards.
      c. And as approved over this geographical area
   2. International Building Code
   3. International Fire Code
   4. Underwriter's Laboratories, Inc. Publications: List of Inspected Fire Protection Equipment and Materials.
   5. Applicable state and local codes and ordinances pertaining to fire protection systems and equipment.
   6. Requirements of State Fire Marshal.
   7. Requirements of Local Fire Marshal.
   8. Safety Code for Elevators and Escalators.
   9. Life Safety Code.

B. Work in Idaho must be done by an Idaho licensed sprinkler contractor and plans submitted to and approved by the office of the Idaho State Fire Marshall.

C. The contractor shall notify the Idaho State Fire Marshall and the Local Fire Department to witness the test of the fire sprinkler system.

1.6 VERIFICATIONS AND REQUIREMENTS

A. Fire Sprinkler Contractor shall verify adequacy of the water service to the building.

B. Fire Sprinkler Contractor shall also check with the Local City Fire Marshal, the State Fire Marshal and the Fire Rating Bureau to determine requirements for the following:
1. Fire department connections
2. Test connections
3. Exterior and interior piping
4. Spacing of heads
5. Rating of building

1.7 FEES AND PERMITS

A. Fees or permits required to furnish and install the fire protection system shall be included as part of this Section of the Contract Documents.

1.8 PIPE SIZING

A. Fire Sprinkler Contractor shall be required to size all piping for this project using the Hydraulic Calculation Method in accordance with requirements of National Fire Protection Association Pamphlet No. 13 for Hydraulically Designed Sprinkler Systems

1.9 SUBMITTALS

A. See General Section – for submittal procedures.

B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
1. Fire Sprinkler Contractor shall submit complete layouts to underwriters having jurisdiction and the State Fire Marshal for approval prior to submission to Architect.
    a. Particular attention shall be paid in layout to coordination of sprinkler piping and structural system of beams and mechanical ductwork. Notations shall be made on shop drawings where pipes are required to pass thru beams.
    b. Wall sprinkler shall be used in ramp areas where headroom is at a minimum and shall be arranged so as not to conflict with egress and door swings.
    c. Careful coordination shall be given to avoid changing ceiling lighting systems as shown on drawings.
    d. Sprinklers must be spaced equally with lights and ceiling diffusers.
    e. No fabrication of piping shall be done until piping drawings are accepted by the Architect, the Mechanical Engineer and State Fire Marshal.
2. The Fire Protection Sprinkler Contractor shall submit drawings that have been prepared and overseen by a NICET Certified Engineering Technician in fire protection with a minimum, Level 3 rating, or by a Professional Engineer in fire protection. This person shall be employed and be a staff member of the Fire Protection Contractor and shall be required to certify that the drawings are in accordance with the specifications and all regulatory requirements. All drawings shall be signed by the CET or stamped and signed by the Professional Engineer.
3. All area with exposed structure, piping shall neatly follow and be held tight to the line of the deck. When approved by the Architect, piping may follow the line of the exposed structure.

D. Project Record Documents: Record actual locations of components and tag numbering.

E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.10 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer: The sub-contractor for the fire protection system shall be duly licensed by the state, county and city in which the project is being constructed. The fire sprinkler contractor must be engaged in the installation of the types of automatic fire sprinkler system required for this project and be fully familiar with all local conditions, specified codes and requirements. Prior to installation, submit data for approval showing that the Fire Sprinkler Contractor has successfully installed Automatic Fire Sprinkler Systems of the type and design as specified herein.

C. Designer: The designer for the fire sprinkler system shall be a staff employee of the “Installer” and shall be either a licensed Fire Protection Engineer in the State of Idaho, or a Certified Engineering Technician in Fire Protection, Level III (NICET Level III). Registration or certification shall be active during the entire contract period. The designer shall certify that the drawings and installation are in accordance with the intent of the plans and specifications. The designer shall make a complete and final inspection of the installation, including operating all alarms, control valves, checking all piping, seismic bracing, hangers, etc. After checking all components of the system, the designer shall provide a letter stating the installation is complete, operational and in accordance with approved plans and specifications. If changes have been made in the installation since the plans were approved, the designer shall correct the shop drawings and provide as-built drawings to the Owner with the letter.

D. Valves: Bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

F. Final Inspection: The Sprinkler Contractor CET or PE responsible for overseeing this project shall make a complete and final inspection of the installation, checking out all alarms, valves, piping, seismic bracing, hangers, etc., conduct a final main drain test on the system, and provide documentation of this final inspection

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION SYSTEMS

A. Sprinkler Systems: Conform work to NFPA 13.

B. Welding Materials and Procedures: Conform to ASME Code.

2.2 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A 795 Schedule 10 or ASTM A 53 Schedule 40, black.
   1. Steel Fittings: ASME B16.9, wrought steel or buttwelded.
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings, ASME B16.4 and threaded fittings.
   3. Malleable Iron Fittings: ASME B16.3 and threaded fittings.
   4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.3 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm): Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 inches (50 mm) and Over: Carbon steel, adjustable, clevis.

C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

D. Wall Support for Pipe Sizes to 3 inches (80 mm): Cast iron hook.

E. Wall Support for Pipe Sizes 4 inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.

F. Vertical Support: Steel riser clamp.

G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

H. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.4 GATE VALVES

A. A. Up to and including 2 inches (50 mm):
1. Manufacturers:
   a. Nibco ; Product Model F-637-31 Flanged Ends.
   b. Mueler; Product Model A-2073-6 Flanged Ends.
2. Bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends.

B. Over 2 inches (50 mm):
1. Manufacturers:
   a. Nibco ; Product Model F-637-31 Flanged Ends.
   b. Mueler; Product Model A-2073-6 Flanged Ends.
2. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged ends.

C. Over 4 inches (100 mm):
1. Manufacturers:
   a. Nibco ; Product Model F-637-31 Flanged Ends.
   b. Mueler; Product Model A-2073-6 Flanged Ends.
2. Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

2.5 GLOBE OR ANGLE VALVES

A. Up to and including 2 inches (50 mm):
1. Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable rubber disc, threaded ends, with backseating capacity repackable under pressure.

B. Over 2 inches (50 mm):
1. Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.6 BALL VALVES

A. Up to and including 2 inches (50 mm):
1. Manufacturers:
   a. Milwaukee Model BBSC with threaded ends
   b. Nibco Model T-505 with threaded ends
   c. Nibco Model G-505 with grooved ends
2. Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.

B. Over 2 inches (50 mm):
1. Manufacturers:
   a. Milwaukee Model BBSC with threaded ends
   b. Nibco Model T-505 with threaded ends
   c. Nibco Model G-505 with grooved ends

2. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 10 inches (250 mm) and over, flanged.

2.7 BUTTERFLY VALVES

A. Bronze Body:
1. Manufacturers:
   a. Mueller:
      1) Model B-3250-00 Wafer type with valve tamper switch
      2) Model B-3250-52 Grooved ends type with valve tamper switch
   b. Nibco:
      1) Model WD3510-4 Wafer type with valve tamper switch
      2) Model GD1765-4 Grooved type with valve tamper switch
   c. Norris Model NW285AC-2K Wafer type with optional tamper switch
   d. Pratt Model IBV
2. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and built-in tamper proof switch rated 10 amp at 115 volt AC.

B. Cast or Ductile Iron Body
1. Manufacturers:
   a. Mueller:
      1) Model B-3250-00 Wafer type with valve tamper switch
      2) Model B-3250-52 Grooved ends type with valve tamper switch
   b. Nibco:
      1) Model WD3510-4 Wafer type with valve tamper switch
      2) Model GD1765-4 Grooved type with valve tamper switch
   c. Norris Model NW285AC-2K Wafer type with optional tamper switch
   d. Pratt Model IBV
2. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and internal tamper switch rated 10 amp at 115 volt AC.

2.8 CHECK VALVES

A. Up to and including 2 inches (50 mm):
1. Manufacturers:
   a. Nibco Model KT-403-W
   b. Walworth Figure 412
2. Bronze body and swing disc, rubber seat, threaded ends.

B. Over 2 inches (50 mm):
1. Manufacturers:
   a. Nibco Model F-938-31
   b. Walworth Fig. 883F
   c. Mueller Model A-2120-6
2. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.

C. 4 inches (100 mm) and Over:
1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.9 DRAIN VALVES

A. Compression Stop:
1. Bronze with hose thread nipple and cap.

B. Ball Valve:
1. Manufacturers:
   a. Milwaukee Model BBSC with threaded ends
   b. Nibco Model T-505 with threaded ends
   c. Nibco Model G-505 with grooved ends

2. Brass with cap and chain, 3/4 inch (20 mm) hose thread.

2.10 POST INDICATOR VALVES

A. Furnish and install at each fire service entrance a “Post Indicator Valve” with alarm switch equal to Kennedy.

PART 3 - EXECUTION

3.1 FIRE SPRINKLER CONTRACTOR

A. It is the responsibility of the Fire Sprinkler Contractor to inspect the job site prior to fabricating materials. The Fire Sprinkler Contractor shall coordinate the design with all plans and other contractors so that construction can be done without problems. The Fire Sprinkler Contractor shall call for a meeting with all trades to coordinate and sequence installation with the progress of other mechanical and structural systems, and work out spaces for all of the work. By doing so, the project will proceed at the General Contractor’s completion schedule.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Areas Subject to Freezing Temperatures:
1. Branches serving these areas may contain a cold weather valve and anti-freeze loop or dry heads.

E. Group piping whenever practical at common elevations.

F. Sleeve pipes passing through partitions, walls, and floors.

G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

H. Pipe Hangers and Supports:
1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
2. Place hangers within 12 inches of each horizontal elbow.
3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
6. Provide copper plated hangers and supports for copper piping.
7. Prime coat exposed steel hangers and supports. Refer to Painting Section. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain bottom of pipe level.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to General Painting Section.

K. Do not penetrate building structural members unless indicated and approved in writing by the Structural Engineer.

L. Provide sleeves when penetrating footings, floors, and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

N. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

O. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.

P. Provide gate valves for shut-off or isolating service.

Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

R. Work shall be executed and inspected in accord with laws, ordinances, rules and regulations of local authorities having jurisdiction over such work. Should any change in the drawings or specifications be required to conform to these ordinances, Fire Sprinkler Contractor shall notify the Architect-Engineer at time of submitting his bid. After entering into the contract, Fire Sprinkler Contractor shall be held to complete all necessary work to meet local requirements without expense to Owner.

S. Sprinkler system shall be installed such that spacing of sprinkler heads in relation to ceiling shall not exceed that permitted for type of ceiling construction involved.

T. General Contractor is required under contract stipulations to leave chases and openings in walls, floors, ceilings, partitions and beams, etc., provided Fire Sprinkler Contractor shall furnish to General Contractor full information as to locations, dimensions, etc., of such chases and openings including the provision and proper setting of all sleeves and other equipment in advance of construction of work so as to cause no delay in work.

U. Should any cutting of walls, floors, ceilings, partitions, etc., be required for proper installation of the work or apparatus of Fire Sprinkler Contractor due to his failure in giving the General Contractor proper information at time required, such cutting shall be done at his own expense and in a manner acceptable to Architect-Engineer. All drilling and patching for anchor bolts, hangers, and other supports shall be subject to approval of Architect-Engineer.

V. Siamese connections and watermains to sprinkler room shall be provided by Fire Sprinkler Contractor and connections to sprinkler system shall be by Fire Sprinkler Contractor.

W. Conduits and wiring for alarm contacts, power wiring from starter to motor, and starter shall be provided and wired complete by Electrical Contractor for testing by Fire Sprinkler Contractor. Control wiring from starter to control and safety devices shall be provided and wired by Fire Sprinkler Contractor.

3.4 FIELD TESTING

A. All portions of the system shall be hydrostatically tested.

B. Flushing of underground piping shall be done in accord with National Fire Protection Association.

C. On completion of the work, system shall be tested by full flow.
1. Each control valve for each sprinkler system shall be tested by use of an inspector's test valve or the application of heat to sprinkler head most remote from the valve.
2. All alarms and other devices shall be tested.
3. All appliances and equipment for testing shall be furnished by Fire Sprinkler Contractor.
4. Expenses, except for water and electricity used in connection with the tests, shall be defrayed by Fire Sprinkler Contractor.
5. On completion of tests by Fire Sprinkler Contractor, any defects detected shall be corrected by Fire Sprinkler Contractor at his own expense and additional tests made until systems are proved satisfactory.

6. Fire Sprinkler Contractor shall submit to Architect-Engineer a certificate covering materials and tests, similar to that specified by National Fire Protection Association, with a request for formal inspection at least five working days prior to date of inspection. The State and Local Fire Marshalls shall also be notified to witness this test. At such inspection any or all of required tests shall be repeated as directed by the Architect-Engineer.

END OF SECTION 210500

SECTION 210553 - IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe Markers.

1.2 RELATED REQUIREMENTS

A. General Painting Section - Painting: Identification painting.

1.3 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.4 SUBMITTALS

A. See General Section – for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

A. Automatic Controls: Tags.

B. Control Panels: Nameplates.

C. Instrumentation: Tags.

D. Major Control Components: Nameplates.

E. Piping: Tags.

F. Relays: Tags.

G. Small-sized Equipment: Tags.

H. Valves: Namplates and ceiling tacks where above lay-in ceilings.

2.2 NAMEPLATES

A. Manufacturers:
1. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
2. Seton Identification Products: www.seton.com.

B. Description: Laminated three-layer plastic with engraved letters.
1. Letter Color: White.
2. Letter Height: 1/4 inch (6 mm).
3. Background Color: Black.
4. Thickness: 1/8 inch (3 mm).
5. Plastic: Conform to ASTM D 709.

2.3 TAGS

A. Manufacturers:
1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
2. Brady Corporation: www.bradycorp.com.
3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
4. Seton Identification Products: www.seton.com.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.4 STENCILS

A. Manufacturers:
1. Brady Corporation: www.bradycorp.com.
2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
3. Seton Identification Products: www.seton.com.

B. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
6. Equipment: 2-1/2 inch high letters.

C. Stencil Paint: As specified in Painting Section, semi-gloss enamel, colors conforming to ASME A13.1.

2.5 PIPE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradycorp.com.
2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
3. MIFAB, Inc.: www.mifab.com.
4. Seton Identification Products: www.seton.com.

B. Color: Conform to ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. Color code as follows:
1. Fire Quenching Fluids: Red with white letters.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Painting Section - Painting for stencil painting.

3.2 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with Painting Section.

D. Install plastic pipe markers completely around pipe in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

G. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 210553

SECTION 211300 – WET PIPE FIRE SUPPRESSION SPRINKLERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. System design, installation, and certification.

1.2 RELATED REQUIREMENTS

A. Section 21 0500 - Common Requirements for Fire Suppression: Pipe, fittings, and valves.

B. Section 21 0548 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment.

C. Section 21 0553 - Identification for Fire Suppression Piping and Equipment.

D. Section 26 0519 – Line Voltage Electrical Power Conductors and Cables: Electrical characteristics and wiring connections.

E. Section 26 6411 – Automatic Fire Alarm and Detection System.

1.3 REFERENCE STANDARDS

A. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.4 SUBMITTALS

A. See Section 01 3300 – for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:
   1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
   2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
   3. Submit shop drawings to authority having jurisdiction for approval. Submit proof of approval to Architect.

D. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

E. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

F. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
   3. Sprinkler Wrenches: For each sprinkler type.

1.5 QUALITY ASSURANCE

A. Maintain one copy of referenced design and installation standard on site.

B. Conform to UL requirements.

C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State of Idaho.

D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

E. Equipment and Components: Provide products that bear UL label or marking.

F. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:
   1. Tyco Fire Suppression & Building Products: www.tyco-fire.com.
   2. Viking Corporation: www.vikinggroupinc.com.
   3. Reliable: www.reliablehvac.com
   4. Central: www.aecinfo.com
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for entire building.

B. Occupancy: Comply with NFPA 13 for hazard classification..

C. Water Supply: Determine volume and pressure from water flow test data.
   1. Revise design with test data available prior to submittals.

D. Provide fire department connections where indicated.

E. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.3 SPRINKLERS

A. Suspended Ceiling Type: Semi-recessed pendant type with matching screw on escutcheon plate.
   1. Finish: Enamel, color white.
   2. Escutcheon Plate Finish: White.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

B. Concealed Ceiling Type: Fully recessed with surface cap.
   1. Finish: Enamel, color white.
   2. Surface Cap Finish: White.
   3. Fusible Link: Fusible solder link type, temperated rated for specific area hazard.

C. Exposed Area Type: Pendant upright type with guard.

1. Finish: Brass.
2. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

D. Sidewall Type: Semi-recessed horizontal sidewall type with matching screw on escutcheon plate.
1. Finish: Brass.
2. Escutcheon Plate Finish: Brass.
3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

E. Dry Sprinklers: Standard pendant type with matching screw on escutcheon plate.
1. Finish: Brass.
2. Escutcheon Plate Finish: Brass.
3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

F. Furnish and install special sprinkler heads on each side of all windows or doors with windows in the two hour fire rated walls as required by I.B.C. 715.
1. White enamel finish.
2. Liquid filled bulb link.
3. White escutcheon plates.

G. Guards: Finish to match sprinkler finish.

H. Spray Nozzles: Brass with solid cone discharge, 30 degrees of arc with blow-off dust cap.

2.4 SPRINKLER HEADS

A. Sprinkler head orifice sizes shall be in accordance with National Fire Protection Association.

B. Any change in spacing must be in straight rows with lights and walls.

C. Sprinkler heads shall be automatic and conventional (spray) type approved by a nationally recognized testing laboratory.

D. Each head shall have an orifice of nominal 1/2" diameter.

E. Sprinkler heads shall be pendant type where installed above a hung ceiling.

2.5 PROTECTIVE GUARDS

A. Heavy wire protective guard shall be provided for sprinkler heads located in heavy use areas where damage may result including, but not limited to:

B. Gyms, Wrestling rooms

C. Locker rooms

D. Multi-purpose rooms

E. Shops

F. Equipment rooms

2.6 PIPING SPECIALTIES

A. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm and electric alarm, with pressure retard chamber and variable pressure trim ; with test and drain valve.

B. Electric Alarm: 24 volt D.C. electrically operated chrome plated gong with pressure alarm switch.

C. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

PART 3 - EXECUTION

3.1 INSPECTION

A. It is the responsibility of the Fire Sprinkler Contractor to inspect the job site prior to fabricating materials. The Fire Sprinkler Contractor shall coordinate the design with all plans and other contractors so that construction can be done without problems. The Fire Sprinkler Contractor shall call for a meeting with all trades to coordinate and sequence installation with the progress of other mechanical and structural systems, and work out spaces for all of the work. By doing so, the project will proceed at the General Contractor's completion schedule.

3.2 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Work to begin inside building, at base of flange to underground fire protection water main.

D. Install system in compliance with methods detailed in NFPA-13, including seismic requirements for Area 3.

E. Offset as needed for other trades. Avoid conflict in areas of tight construction. Do not obstruct access to air control boxes, access doors, lights or other ceiling mounted equipment.

F. Submit piping and equipment data sheets for review by the Architect prior to the start of the installation.

G. Install piping straight and true to bear evenly on hangers and supports. Keep the interior and ends of new piping thoroughly cleaned of foreign matter by closing pipe openings with caps or plugs during installation. Cover and protect components of the system against dirt, chemical or mechanical injury.

H. Piping shall only be installed in areas where temperatures will not drop below 40°F. If piping must be installed in areas where temperature is not maintained above 40°F, the piping must be fitted with an antifreeze loop and filled with an antifreeze solution per the requirements of NFPA-13.

I. Fire sprinklers shall be centered in ceiling tile in one direction and a minimum of 4-inches from acoustical ceiling ("T") grid. Provide piping offsets or flexible offsets as required that meet the code. Install fire sprinkler head guards on fire sprinklers lower than 7-feet above finished floor and as identified in 2.05.

J. Fire sprinkler piping that is exposed shall be approved and coordinated with the Architect, prior to any pipe fabrication and/or installation of fire sprinkler piping. Care shall be used in locating exposed fire sprinkler piping.

K. Install inspectors test valve at an accessible height, without the use of a ladder, or having to remove ceiling tiles. Location to be approved by the Architect.

L. Provide concrete splash blocks for drains, test valve discharge, etc. Concrete splash blocks shall be pre-fabricated, 2-1/2inches thick.

M. Install special sprinkler heads on each side of windows or doors with windows in the two hour rated fire walls as required by I.B.C. 715.

N. Provide white painted escutcheons around exposed piping, where piping passes through walls or ceilings in a finished area.

O. Field Changes: Do not make field changes for piping layout or sizing without prior approval, after the approval of the fire sprinkler drawings.

P. Provide approved double check valve assembly at sprinkler system water source connection.

Q. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.

R. Locate outside alarm gong on building wall as indicated.

S. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

T. Flush entire piping system of foreign matter.

U. Hydrostatically test entire system.

V. Require test be witnessed by Fire Marshal.

W. Conduct an inspection and operational test at the end of the one year warrantee period in accordance with NFPA-25. Provide a written report to the Owner at the completion of the inspection.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

B. Work with Fire Alarm Contractor to insure system alarms properly when activated.

C. Work with Electrical Contractor to insure that all control devices are properly wired with electrical power and connected to power and alarm systems.

3.4 ACCEPTANCE

A. Acceptance of installation is subject to final inspection and approval by:
   1. Idaho State Fire Marshal's Office.
   2. Local Fire Department.
   3. Architect or his Representative

END OF SECTION 211300

END OF DIVISION 21

DIVISION 22: PLUMBING

END TABLE OF CONTENTS

SECTION 220501 - COMMON PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Furnish labor, materials, and equipment necessary for completion of work as described in Contract Documents.

B. It is the intent of these specifications that the systems specified herein are to be complete and operational before being turned over to the owner. During the bidding process, the contractor is to ask questions or call to the engineer's attention any items that are not shown or may be required to make the system complete and operational. Once the project is bid and the contractor has accepted the contract, it is his responsibility to furnish and install all equipment and parts necessary to provide a complete and operational system without additional cost to the owner.

C. Furnish and install fire stopping materials to seal penetrations through fire rated structures and draft stops.

1.3 SUBMITTALS

A. Substitutions: By specific designation and description, standards are established for specialties and equipment. Other makes of specialties and equipment of equal quality will be considered provided such proposed substitutions are submitted to the Architect for his approval, complete with specification data showing how it meets the specifications, at least 5 working days prior to bid opening. A list of approved substitutions will be published as an addendum, but does not relieve Contractor from meeting all requirements of the specifications.
   1. Submit a single copy of Manufacturer's catalog data including Manufacturer's complete specification for each proposed substitution.
   2. The Architect or Engineer is to be the sole judge as to the quality of any material offered as an equal.

B. Product Data, Shop Drawings: Within 30 days after award of contract, submit 10 sets of Manufacturer's catalog data for each manufactured item.
   1. Literature shall include enough information to show complete compliance with Contract Document requirements.
   2. Mark literature to indicate specific item with applicable data underlined.
   3. Information shall include but not be limited to capacities, ratings, type of material used, guarantee, and such dimensions as are necessary to check space requirements.
   4. When accepted, submittal shall be an addition to Contract Documents and shall be in equal force. No variation shall be permitted.
   5. Even though the submittals have been accepted by the Engineer, it does not relieve the contractor from meeting all of the requirements of the plans and specifications and providing a complete and operational system.

C. Drawings of Record: One complete set of blue line mechanical drawings shall be provided for the purpose of showing a complete picture of the work as actually installed.
   1. These drawings shall serve as work progress report sheets. Contractor shall make notations neat and legible therein daily as the work proceeds.
   2. The drawings shall be kept at the job at a location designated by the Mechanical Engineer.
   3. At completion of the project these "as-built" drawings shall be signed by the Contractor, dated, and returned to the Architect.

D. Operating Instructions and Service Manual: The Mechanical Contractor shall prepare 2 copies of an Operation and Maintenance Manual for all mechanical systems and equipment used in this project. Manuals shall be bound in hard-backed binders and the front cover and spine of each binder shall indicate the name and location of the project. Use plastic tab indexes for all sections. Provide a section for each different type of equipment item. The following items shall be included in the manual, together with any other pertinent data. This list is not complete and is to be used as a guide.
   1. Provide a master index at the beginning of the manual showing all items included.
   2. The first section of the manual shall contain:
      a. Names, addresses, and telephone numbers of Architect, Mechanical Engineer, Electrical Engineer, General Contractor, Plumbing Contractor, Sheet Metal Contractor, and Temperature Control Contractor.
      b. List of Suppliers which shall include a complete list of each piece of equipment used with the name, address, and telephone number of vendor.
      c. General Description of Systems including –
         1) Location of all major equipment
         2) Description of the various mechanical systems
         3) Description of operation and control of the mechanical systems
         4) Suggested maintenance schedule
      d. Copy of contractor's written warranty
   3. Provide a copy of approved submittal literature for each piece of equipment.
   4. Provide maintenance and operation literature published by the manufacturer for each piece of equipment which includes: oiling, lubrication and greasing data; belt sizes, types and lengths; wiring diagrams; step-by-step procedure to follow in putting each piece of mechanical equipment in operation.
   5. Include parts numbers of all replaceable items.
   6. Provide control diagram and operation sequence, along with labeling of control piping and instruments to match diagram.
   7. Include a valve chart indicating valve locations.
   8. Include air balance and/or water balance reports.

1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Perform work in accordance with applicable provisions of local and state Plumbing Code, Gas Ordinances, and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
   2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Architect in writing of such differences.

B. Applicable Specifications: Referenced specifications, standards, and publications shall be of the issues in effect on date of Advertisement for Bid.
   1. "Heating, Ventilating and Air Conditioning Guide" published by the American Society of Heating and Air Conditioning Engineers.
   2. "Engineering Standards" published by the Heating, Piping, and Air Conditioning Contractors National Association.
   3. "2012 International Building Code", "2012 International Mechanical Code", and "2012 International Fire Code" as published by the International Conference of Building Officials.
   4. “2012 Idaho Plumbing Code” as published by the International Association of Plumbing and Mechanical Officials.
   5. "National Electrical Code" as published by the National Fire Protection Association.
   6. "2012 International Energy Conservation Code ".

1.5 INSPECTIONS AND PERMITS

A. Pay for permits, fees, or charges for inspection or other services. Local and state codes and ordinances must be properly executed without expense to Owner and are considered as minimum requirements. Local and state codes and ordinances do not relieve the Contractor from work shown that exceeds minimum requirements.

1.6 **ADDITIONAL WORK**:

A. Design is based on equipment as described in the drawing equipment schedule. Any change in foundation bases, electrical wiring, conduit connections, piping, controls and openings required by alternate equipment submitted and approved shall be paid for by this division. All work shall be in accordance with the requirements of the applicable sections.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Inspection:
   1. Examine premises and understand the conditions which may affect performance of work of this Division before submitting proposals for this work.
   2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

B. Drawings:
   1. Plumbing drawings show general arrangement of piping, equipment, etc, and do not attempt to show complete details of building construction which affect installation. This Contractor shall refer to architectural, structural, mechanical, and electrical drawings for additional building detail which affect installation of his work.
      a. Follow plumbing drawings as closely as actual building construction and work of other trades will permit.
      b. No extra payments will be allowed where piping and/or ductwork must be offset to avoid other work or where minor changes are necessary to facilitate installation.
      c. Everything shown on the plumbing drawings shall be the responsibility of Plumbing Contractor unless specifically noted otherwise.
   2. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over mechanical drawings.
   3. Because of small scale plumbing drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions. Do not scale drawings for locations of equipment or piping. Refer to large scale dimensioned drawings for exact locations.

C. Insure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.
   1. If approval is received to use other than specified items, responsibility for specified capacities and insuring that items to be furnished will fit space available lies with this Division.
   2. If non-specified equipment is used and it will not fit job site conditions, this Contractor assumes responsibility for replacement with items named in Contract Documents.

3.2 PREPARATION

A. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
   1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
   2. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
   3. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

3.3 INSTALLATION

A. Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

3.4 **STORAGE AND PROTECTION OF MATERIALS**:

A. Provide storage space for storage of materials and assume complete responsibility for losses due to any cause whatsoever. Storage shall not interfere with traffic conditions in any public thoroughfare.

B. Protect completed work, work underway, and materials against loss or damage.

C. Close pipe openings with caps or plugs during installation. Cover fixtures and equipment and protect against dirt, or injury caused by water, chemical, or mechanical accident.

3.5 EXCAVATION AND BACKFILL

A. Perform necessary excavation of whatever substance encountered for proper laying of all pipes and underground ducts.
   1. Excavated materials not required for fill shall be removed from site as directed by Engineer.
   2. Excavation shall be carried low enough to allow a minimum coverage over underground piping of 5'-0" or to be below local frost level.
   3. Excess excavation below required level shall be backfilled at Contractor's expense with earth, sand, or gravel as directed by Engineer. Tamp ground thoroughly.
   4. Ground adjacent to all excavations shall be graded to prevent water running into excavated areas.

B. Backfill pipe trenches and allow for settlement.
   1. Backfill shall be mechanically compacted to same density as surrounding undisturbed earth.
   2. Cinders shall not be used in backfilling where steel or iron pipe is used.
   3. No backfilling shall be done until installation has been approved by the Engineer.

3.6 COOPERATION

A. Cooperate with other crafts in coordination of work. Promptly respond when notified that construction is ready for installation of work under Division 22. Contractor will be held responsible for any delays which might be caused by his negligence or failure to cooperate with the other Contractors or crafts.

3.7 SUPERVISION

A. Provide a competent superintendent in charge of the work at all times. Anyone found incompetent shall be removed at once and replaced by someone satisfactory, when requested by the Architect.

3.8 **INSTALLATION CHECK**:

A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule shall visit the project to inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the project as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to the Engineer.

B. Each equipment supplier's representative shall furnish to the Owner, through the Engineer, a written report certifying the following:
   1. Equipment has been properly installed and lubricated.
   2. Equipment is in accurate alignment.
   3. Equipment is free from any undue stress imposed by connecting piping or anchor bolts.
   4. Equipment has been operated under full load conditions.
   5. Equipment operated satisfactorily.

C. All costs for this installation check shall be included in the prices quoted by equipment suppliers.

3.9 CLEANING EQUIPMENT AND PREMISES

A. Properly lubricate equipment before Owner's acceptance.

B. Clean exposed piping, equipment, and fixtures. Repair damaged finishes and leave everything in working order.

C. Remove stickers from fixtures and adjust flush valves.

D. Trap elements shall be removed during cleaning and flushing period. Replace trap elements and adjust after cleaning and flushing period.

3.10 TESTS

A. No piping work, fixtures, or equipment shall be concealed or covered until they have been inspected and approved by the inspector. Notify inspector when the work is ready for inspection.

B. All work shall be completely installed, tested as required by Contract Documents and the city and county ordinances and shall be leak-tight before the inspection is requested.

C. Tests shall be repeated to the satisfaction of those making the inspections.

D. Water piping shall be flushed out, tested at 100 psi and left under pressure of supply main or a minimum of 40 psi for the balance of the construction period.

3.11 WARRANTEE

A. Contractor shall guarantee work under Division 22 to be free from inherent defects for a period of one year from acceptance.
   1. Contractor shall repair, revise or replace any and all such leaks, failure or inoperativeness due to defective work, materials, or parts free of charge for a period of one year from final acceptance, provided such defect is not due to carelessness in operation or maintenance.

B. In addition to warrantee specified in General Conditions and plumbing systems are to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

3.12 SYSTEM START-UP, OWNER'S INSTRUCTIONS

A. Owner's Instructions
   1. Instruct building maintenance personnel and Owner Representative in operation and maintenance of mechanical systems utilizing Operation & Maintenance Manual when so doing.
   2. Minimum instruction periods shall be as follows –
      a. Plumbing - Four hours.
   3. Instruction periods shall occur after Substantial Completion inspection when systems are properly working and before final payment is made.
   4. None of these instructional periods shall overlap another.

END OF SECTION 220501

SECTION 22 0502 - DEMOLITION AND REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 0501 apply to this Section.

1.2 SUMMARY

A. Under this section remove obsolete piping and mechanical equipment and relocate, reconnect or replace existing piping affected by demolition or new construction. Remove concealed piping abandoned due to demolition or new construction, or cap piping flush with existing surfaces.

1.3 DRAWINGS AND EXISTING CONDITIONS

A. All relocations, reconnections and removals are not necessarily indicated on the drawings. As such, the Contractor shall make adequate allowance in his proposal for this work as no extra charges will be allowed for these items.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 TEMPORARY CONNECTIONS

A. Where existing piping must remain in service to supply occupied areas during construction, provide temporary piping, connections, and equipment to maintain service to such areas. All shall be performed in a neat and safe manner to prevent injury to the building or its occupants.

3.2 EXISTING TO BE ABANDONED

A. All Required drilling, cutting, block-outs and demolition work required for the removal and/or installation of the mechanical system is the responsibility of this Contractor.

B. No joists, beams, girders, trusses or columns shall be cut by any Contractor without written permission from the Architect.

C. The patching, repair, and finishing to existing or new surfaces is the responsibility of this Contractor, unless specifically called for under sections of specifications covering these materials.

D. Disconnect all equipment that is to be removed or relocated. Relocate any existing equipment that obstructs new construction.

3.3 EXISTING TO REMAIN IN USE

A. Where affected by demolition or new construction, relocate, replace, extend, or repair piping and equipment to allow continued use of same. Use methods and materials as specified for new construction.

3.4 MATERIALS AND EQUIPMENT REMOVED

A. All obsolete materials, piping, and equipment shall become the property of the Contractor and be removed from the site promptly.

END OF SECTION 22 0502

SECTION 220503 - PIPE, PIPE FITTINGS, PIPE HANGERS & VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. General piping and valve materials and installation procedures for all piping systems.

1.3 QUALITY ASSURANCE

A. Manufacture:
   1. Use domestic made valves, pipe and pipe fittings.

B. General: Support components shall conform to Manufacturer's Standardization Society Specification SP-58.

PART 2 - PRODUCTS

2.1 VALVES

A. Ball Valves:
   1. 2" and smaller for domestic water service:
      a. Milwaukee BA-100, bronze, screwed, 600# WOG ball valve with Teflon seats
      b. Victaulic S/722.
   2. 2" and smaller for heating hot water service:
      a. Milwaukee BA-100, bronze, screwed, 600# WOG ball valve with Teflon seats
      b. Victaulic S/722.
   3. 2½” and larger - 3 piece full port, bronze, flanged 400# WOG with seats rated for temperature service.
   4. Ball valves shall be used where ever possible.

B. Butterfly Valves:
   1. 2" and Smaller:
      a. Milwaukee BB2-100, bronze body, 350# WOG, stainless steel disc and stem, viton seal, and lever handle
      b. Victaulic S/700, 300, 709.
   2. 2 ½" and Larger:
      a. Milwaukee ML-223-E, lug wafer type, iron body, 200# WOG with aluminum-bronze disc, 416 S.S. stem, EPDM liner rated for temperature conditions and multi-lock lever
      b. Victaulic
   3. Butterfly valves may be used in lieu of gate, globe, and ball valves where temperature and pressure allow.

C. Cutoff service valves may be gate Valves:
   1. Up to 2" inclusive: Milwaukee No. 148
   2. 2 1/2" and larger: Milwaukee No. F-2885

D. Valves used in bypasses and for throttling service may be globe valves:
   1. Up to 2" inclusive: Milwaukee No. 590
   2. 2 1/2" and larger:
      a. Milwaukee No. 359
      b. Victaulic actuated butterfly valves

E. Check Valves:
1. Up to 2" inclusive: Milwaukee No. 509
2. 2 1/2" and larger:
   a. Milwaukee No. F-2974
   b. Victaulic 716, 779

F. Stop and Waste Cocks:
1. Milwaukee No. F-2885 with 3/4" Milwaukee No. 105 gate valve tapped into pipe on outlet side of main valve.

G. Use ball valves or butterfly valves everywhere unless noted otherwise.

H. Approved Manufacturers:
1. Crane
2. Nibco
3. Hammond
4. Stockham
5. Milwaukee
6. Victaulic

2.2 PIPE

A. Exposed waste, vent and water piping connections to fixtures shall be chrome plated.

B. Victaulic couplings and fittings may be used in lieu of welded, flanged or threaded connections on chilled water, condenser water and hot water heating systems. Grade "E" gaskets shall be used up to a maximum operating temperature of 230 deg. F. Where Victaulic couplings and fittings are used, Victaulic Services 700, 300, and 709 butterfly valves may also be used. All pipe grooving and installation shall be in accordance with manufacturer's latest recommendations.

C. Condensate Drain Piping: Type "M" copper with sweat fittings or Schedule 40 PVC pipe and fittings.

2.3 PIPE HANGERS

A. Adjustable, malleable iron clevis type of a diameter adequate to support pipe size.

B. Approved Manufacturers:
1. B-Line Systems Fig. B3100
2. Grinnell No. 260
3. Kin-Line 455
4. Superstrut CL-710

2.4 INSULATING COUPLINGS

A. Suitable for at least 175 PSIG WP at 250 deg F.

B. Approved Manufacturers:
1. Central Plastics Co
2. Victaulic Co
3. Watts Regulator Co

2.5 EXPANSION JOINTS

A. Install at all building expansion joints and as shown on the drawings, flexible, or nipple/flexible coupling combinations for added expansion/deflection. Submit Manufacturer’s data.

B. Approved Manufacturers
1. Victaulic Style 155, 150

2. Grinnell - Gruv-Lok
3. Garlock Garlflex 8100
4. Vibration Mountings & Controls, Inc.

2.6 SLEEVES

A. Sleeves shall be standard weight galvanized iron pipe, Schedule 40 PVC, or 14 gauge galvanized sheet metal two sizes larger than pipe or insulation.

B. Steel or heavy steel metal of the telescoping type of a size to accommodate pipe and covering wherever it passes through floors, walls, or ceilings.

2.7 INTERMEDIATE ATTACHMENTS

A. Continuous threaded rod may be used wherever possible.

B. No chain, wire, or perforated strap shall be used.

2.8 FLOOR AND CEILING PLATES

A. Brass chrome plated

2.9 APPROVED MANUFACTURERS - Grinnell and Fee/Mason

A. Concrete Inserts: Grinnell Fig. 282

B. Pipe Hanger Flange: Grinnell Fig. 163

C. Vertical Pipe: Grinnell Fig. 261 or equal.

D. Cast Iron Pipe: Grinnell Fig. 260 clevis hanger or equal

E. Pipe Attachments for steel pipe with 1" or less of insulation:
1. Grinnell Fig. 108 ring
2. Grinnell Fig. 114 turnbuckle adjuster
3. Or equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Contractor from responsibility for proper erection of systems of piping in every respect.

B. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
1. Cut piping accurately for fabrication to measurements established at site and work into place without springing or forcing.
2. Do not use pipe hooks, chains, or perforated metal for pipe support.
3. Remove burr and cutting slag from pipes.
4. Make changes in direction with proper fittings.
5. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
6. Support piping at 8 feet on center maximum for pipe 1-1/4 inches or larger and 6 feet on center maximum for pipe one inch or less. Provide support at each elbow. Install additional support as required.

7. Suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps (except underground pipe). Laying of piping on any building member is not allowed.

C. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings. Provide accessible, ground joint unions in piping at connections to equipment.

D. Make connections of dissimilar metals with insulating couplings.

E. Provide sleeves around pipes passing through floors, walls, partitions, or structural members.
1. Seal sleeves with plastic or other acceptable material.
2. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade.

F. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

G. Install piping systems so they may be easily drained.

H. Grade soil and waste lines within building perimeter 1/4 inch fall per ft in direction of flow.

I. Insulate water piping buried within building perimeter.
1. Do not use reducing bushings, street elbows, or close nipples.
2. Bury water piping 6 inches minimum below bottom of slab and encase in 2 inches minimum of sand.
3. Do not install piping in shear walls.

3.2 HORIZONTAL PIPING INSTALLATION

A. Locate hangers, supports, and anchors near or at changes in piping direction and concentrated loads.

B. Provide for vertical adjustment to maintain pitch required for proper drainage.

C. Allow for expansion and contraction of the piping.

3.3 PIPE SLEEVES AND INSERTS

A. Set sleeves before concrete is poured or floors finished.

B. Inserts for units should be placed in the concrete or masonry during construction to avoid cutting of finished work. When and if cutting becomes necessary, it must be done in accordance with the cutting and patching specifications.

3.4 FLOOR AND CEILING PLATES

A. Install on all pipes passing through floors, partitions, and ceilings.

3.5 UNIONS AND CONNECTIONS

A. Install malleable ground joint unions in hot and cold water piping throughout the system so that any portion can be taken down for repairs or inspections without injury to same or covering.

B. Running threads or long screws will not be permitted in jointing any pipe.

C. Provide dielectric waterways Style #47 between ferrous and non-ferrous metals.

3.6 FIRE STOPPING

A. Fire stop all penetrations of fire walls, fire barriers, fire petitions, and other fire rated walls and ceilings and floors as per IBC Section 711. See Specification 22 0800.

END OF SECTION 220503

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT

PART 4 - GENERAL

4.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install identification of plumbing piping and equipment as described in Contract Documents.

PART 5 - PRODUCTS

5.1 MATERIALS

A. Paint:
   1. One Coat Primer:
      a. 6-2 Quick Drying Latex Primer Sealer over fabric covers.
      b. 6-205 Metal Primer under dark color paint.
      c. 6-6 Metal Primer under light color paint.
   2. Finish Coats: Two coats 53 Line Acrylic Enamel.
   3. Performance Standard: Paints specified are from Pittsburgh Paint & Glass (PPG), Pittsburgh, PA www.pittsburghpaints.com or PPG Canada Inc, Mississauga, ON (800) 263-4350 or (905) 238-6441.
   4. Type Two Acceptable Products. See Section 01 6200.
      a. Paint of equal wuality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
         1) Benjamin Moore, Montvale, NJ www.benjaminmoore.com or Toronto, ON (800) 304-0304 or (416) 766-1176.
         2) ICI Dulux, Cleveland, OH or ICI Paints Canada Inc, Concord, ON www.dulux.com.
         3) Sherwin Williams, Cleveland, OH www.sherwin-williams.com.

5.2 VALVE IDENTIFICATION

A. Make a list of and tag all valves installed in this work.
   1. Valve tags shall be of brass, not less than 1"x2" size, hung with brass chains.
   2. Tag shall indicate plumbing or heating service.

PART 6 - EXECUTION

6.1 SCHEDULES

A. Pipe Identification Schedule:
   1. Apply stenciled symbols as follows:

Pipe Use	Abbreviation
Domestic Cold Water	CH
Domestic Hot Water	HW

END OF SECTION 22 0553

SECTION 22 0703 - MECHANICAL INSULATION AND FIRE STOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install mechanical insulation and fire stopping as described in Contract Documents including but not limited to the following:
   1. Cold Water and Rain Drain Piping Insulation
   2. Hot Water Piping Insulation (Domestic)
   3. Fire Stopping

1.3 QUALITY ASSURANCE

A. Insulation shall have composite (insulation, jacket or facing and adhesive used to adhere facing or jacket to insulation) fire and smoke hazard ratings as tested by Procedure ASTM E-84, NFPA 255 and UL 723 not exceeding: Flame Spread of 25 and Smoke Developed of 50.

B. Insulation Contractor shall certify in writing, prior to installation, that all products to be used will meet the above criteria.

C. Accessories, such as adhesives, mastics, cements, and tapes, for fittings shall have the same component ratings as listed above.

D. Products, or their shipping cartons, shall bear a label indicating that flame and smoke ratings do not exceed above requirements.

E. Any treatment of jacket or facings to impart flame and smoke safety shall be permanent.

F. The use of water-soluble treatments is prohibited.

END OF SECTION 220703

SECTION 22 0705 - UNDERGROUND PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install insulation on underground hot and cold water pipes within confines of building as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Insulation:
   1. 1/2 inch thick Armaflex Standard Pipe Insulation
   2. Equal by Rubatex
   3. Equal by Imcolock

B. Joint Sealant:
   1. Armstrong 520

PART 3 - EXECUTION

3.1 INSTALLATION

A. Slip underground pipe insulation onto pipe and seal butt joints.

B. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

END OF SECTION 22 0705

SECTION 220710 - POTABLE WATER PIPE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install insulation on above ground hot and cold water lines, fittings, valves, pump bodies, flanges, and accessories as described in Contract Documents.

PART 2 - PRODUCTS

2.1 INSULATION

A. One inch thick snap-on glass fiber pipe insulation.

B. Heavy density pipe insulation with factory vapor jacket equal to Fiberglass ASJ may be used.

C. Approved Manufacturers:
1. CTM
2. Manville
3. Owens-Corning
4. Knauf

2.2 PVC FITTING, VALVE, & ACCESSORY COVERS

A. Approved Manufacturers:
1. Knauf
2. Zeston

PART 3 - EXECUTION

3.1 APPLICATION

A. Piping:
1. Apply insulation to clean, dry piping with joints tightly butted.
2. Adhere "factory applied vapor barrier jacket lap" smoothly and securely at longitudinal laps with a white vapor barrier adhesive.
3. Adhere 3 inch wide self-sealing butt joint strips over end joints.

B. Fittings, Valves, & Accessories:
1. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
2. Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.

C. Pipe Hangers:
1. Do not allow pipes to come in contact with hangers.
2. Provide 16 ga x 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.

END OF SECTION 220710

SECTION 220711 - HANDICAPPED FIXTURES INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, and Section 22 05 00 apply to this Section.

1.2 SUMMARY

A. Furnish and install handicapped fixtures insulation as described in Contract Documents.

1.3 QUALITY ASSURANCE

A. Insulating device must comply with UBC-85 and federal accessibility standards.

B. Cover must meet federal standards for protection from burns and abrasions.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Insulating device shall be molded fire resistant foam, to encapsulate hot water piping, stop, and P-trap.
   1. Approved Manufacturers:
      a. TCI Products' Skal+Gard SG-100B

B. Safety cover with recloseable sealing strips which allow for removal and replacement for line maintenance may be used on drain and supply lines under lavatories.
   1. Approved Manufacturers:
      a. Handy-Shield
      b. Plumberex

C. Color shall be white.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install tamper-proof locking strap to discourage pilferage.

END OF SECTION 220711

SECTION 22 0720 - RAIN DRAIN INSULATION

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

4.2 SUMMARY

A. Furnish and install rain drain insulation as described in Contract Documents.

PART 5 - PRODUCTS

5.1 MANUFACTURED UNITS

A. 1/2 inch thick pre-formed fibrous glass pipe covering with a vapor barrier jacket or 1/2" thick rubber insulator.

B. End joint strips and overlap seams shall be adhered with a vapor barrier mastic and stapled with outward clinch staples on 4-inch centers. Staples and seams shall be sealed with a second coat of vapor barrier adhesive.

PART 6 - EXECUTION

6.1 INSTALLATION

A. Insulate rain drain lines, overflow lines, and drain bodies.

B. Seal off vapor barrier to pipe at all fittings, hangers, and every 20 feet on straight runs.

END OF SECTION 22 0720

SECTION 220724 - PREMOLDED ONE PIECE PVC FITTINGS INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install premolded one piece PVC fittings insulation as described in Contract Documents.

1.3 QUALITY ASSURANCE

A. Fittings shall be UL rated 25/50 PVC.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Approved Manufacturers:
   1. Zeston

PART 3 - EXECUTION

3.1 INSTALLATION

A. Where factory premolded one piece PVC insulating fitting covers are to be used, proper factory precut Hi-Lo Temp insulation shall be applied to the fitting. Ends of Hi-Lo Temp insulation shall be tucked snugly into throat of fitting and edges adjacent to pipe covering tufted and tucked in. Fully insulate pipe fittings. One piece PVC fitting cover is then secured by stapling, tack fastening, banding or taping ends to adjacent pipe covering.

B. Cold:
   1. Chilled water systems shall be insulated as "A" above and have all seam edges of cover sealed with Zeston's vapor barrier adhesive or equal.
   2. Circumferential edges of cover shall be wrapped with Zeston's vapor barrier pressure sensitive color matched Z tape.
   3. Tape shall extend over adjacent pipe insulation and have an overlap on itself at least 2" on downward side.

C. Hot:
   1. On fittings where temperature exceeds 250 degrees F., two layers of factory precut Hi-Lo Temp insulation inserts shall be applied with a few wrappings of twine on first layer, to be sure there are no voids or hot spots. Fitting cover shall then be applied over Hi-Lo Temp insulation as described above in "A."

END OF SECTION 220724

SECTION 220800-- FIRE STOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install fire stopping as described in Contract Documents.

1.3 QUALITY ASSURANCE

A. Fire stopping material shall meet ASTM E814, E84 and be UL listed.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Material shall be flexible, long lasting, intumescent acrylic seal to accommodate vibration and building movement.

B. Caulk simple penetrations with gaps of 1/4" or less with:
   1. Dow Corning Fire Stop Sealant
   2. Pensil 300

C. Caulk multiple penetrations and/or penetrations with gaps in excess of 1/4" with:
   1. Dow Corning Fire Stop Foam
   2. Pensil 200
   3. IPC flame safe FS-1900
   4. Tremco “Tremstop 1A”

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer's installation instructions explicitly.

B. Seal penetrations of ductwork, piping, and other mechanical equipment through one-hour and two-hour rated partitions as shown on Architectural and Mechanical Drawings.

C. Install fire stopping material on clean surfaces to assure adherence.

END OF SECTION 220800

SECTION 221007-- PRESS TYPE PIPE FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Copper Tubing and Fitting System for Hot and Cold Water Distribution Systems, Sprinkler and Standpipe Systems and Hydronic Piping Systems

1.3 DEFINITIONS

A. ASME: American Society of Mechanical Engineers

B. ASTM: American Society for Testing and Materials

C. EPDM: Ethylene-propylene-diene-monomer

D. IAPMO: International Association of Plumbing & Mechanical Officials

E. ICC: International Code Council

F. MSS: Manufacturers Standardization Society

G. AWWA: American Water Works Association

H. NSF: National Sanitation Foundation

I. UL: Underwriters Laboratory

J. NFPA: National Fire Protection Association

1.4 REFERENCES

A. ASME A13.1: Scheme for the Identification of Piping Systems

B. ASME B1.20.1: Pipe Threads, General Purpose (inch)

C. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings

D. ASME B16.22: Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings

E. ASME B16.26: Cast Copper Alloy Fittings for Flared Copper Tube

F. ASME B31.9: Building Services Piping

G. ASTM B75: Standard Specification for Seamless Copper Tube

H. ASTM B88: Standard Specification for Seamless Copper Water Tube

I. ASTM B813: Standard Specification for Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube

J. ASTM B828: Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings

K. AWWA C651: Standard for Disinfecting Water Mains

L. IAPMO: Uniform Mechanical Code

M. IAPMO: Uniform Plumbing Code

N. ICC: International Plumbing Code

O. ICC: International Mechanical Code

P. MSS-SP-58 Pipe Hangers and Supports Materials, Design and Manufacturer

Q. MSS-SP-69 Pipe Hangers and Supports Selection and Application

R. NFPA 13 Standard for the Installation of Sprinkler Systems

S. NFPA 13D Standard for the Installation of Sprinkler Systems in One/Two Family Dwellings and Mobile Homes

T. NFPA 13R Standard for the Installation of Sprinkler Systems for Residential Occupancies up to and including Four Stories in Height

U. NFPA 14 Standard for the Installation of Standpipe and Hose Systems

V. NSF 61 Drinking Water System Components – Health Effects

1.5 QUALITY ASSURANCE

A. Installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of ProPress copper press joint systems.

B. ProPress copper press fittings shall be installed using the proper tool, actuator, jaws and rings as instructed by the press fitting manufacturer.

C. The installation of copper tubing for hot and cold water distribution systems shall conform to the requirements of the ICC International Plumbing Code or IAPMO Uniform Plumbing Code.

D. The installation of copper tubing in sprinkler or standpipe systems shall conform to NFPA 13, 13D, 13R and 14.

E. The installation of copper tubing in Hydronic systems shall conform to the requirements of the ICC International Mechanical Code or the IAPMO Uniform Mechanical Code.

F. ASME Compliance: ASME B31.9 for building services piping valves.

1.6 DELIVERY, STORAGE AND HANDLING

A. Copper tubing shall be shipped to the job site on truck or in such a manner to protect the tubing. The tubing and fittings shall not be roughly handled during shipment. Tubing and fittings shall be unloaded with reasonable care.

B. Protect the stored product from moisture and dirt. Elevate above grade. When stored inside, do not exceed the structural capacity of the floor.

C. Protect fittings and piping specialties from moisture and dirt.

1.7 PROJECT CONDITIONS

A. Verify length of tubing required by field measurements.

1.8 WARRANTY

A. The tubing and fittings manufacturer shall warrant that the tubing and fittings are free from defects and conform to the designated standard. The warranty shall only be applicable to tubing and fittings installed in accordance with the manufacturer's installation instructions.

B. The manufacturer of the fittings shall not be responsible for the improper use, handling or installation of the product.

PART 2 - PRODUCTS

2.1 MANUFACTURES

A. Press Fittings: Viega**,** Victaulic.

2.2 MATERIAL

A. Tubing Standard: Copper tubing shall conform to ASTM B 75 or ASTM B88.

B. Fitting Standard: Copper fittings shall conform to ASME B16.18, ASME B16.22 or ASME B16.26.

C. Press Fitting: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer.

D. Threaded Fittings: Pipe Threads shall conform to ASME B1.20.1.

E. Hanger Standard: Hangers and supports shall conform to MSS-SP-58.

2.3 SOURCE QUALITY CONTROL

A. All fittings in contact with drinking water shall be listed by a third party agency to NSF 61.

B. All fittings used in Fuel Gas Applications shall be listed by a third party agency as being acceptable for fuel gas piping systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installing contractor shall examine the copper tubing and fittings for defects, sand holes or cracks. There shall be no defects of the tubing or fittings. Any damaged tubing or fittings shall be rejected.

B. The installing contractor shall insure that sealing elements are properly in place and free from damage. For Sizes 2-1/2" to 4", installer should insure that the stainless steel grip ring is in place.

3.2 PREPARATION

A. Copper tubing shall be cut with a wheeled tubing cutter or approved copper tubing cutting tool. The tubing shall be cut square to permit proper joining with the fittings.

B. Remove scale, slag, dirt and debris from inside and outside of tubing and fittings before assembly. The tubing end shall be wiped clean and dry. The burrs on the tubing shall be reamed with a deburring or reaming tool.

3.3 INSTALLATION GENERAL LOCATIONS

A. Plans indicate general location and arrangement of piping systems. Identified locations and arrangements are used to size tubing and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

3.4 INSTALLATION

A. Pressure Rating: Install components having a pressure rating equal to or greater than the system operating pressure.

B. Install piping free of sags, bends and kinks.

C. Change in Direction: Install fittings for changes in direction and branch connections. Where approved, changes in direction may also be made by bending of Types K and L tube.

D. Solder Joints: Solder joints shall be made in accordance with ASTM B 828. The temperature of the joint during soldering shall not be raised above the maximum temperature limitation of the flux.

E. Threaded Joints: Threaded joints shall have pipe joint compound or teflon tape applied to the male threads only. Tighten joint with a wrench and backup wrench as required.

F. Flared Joints: Flared copper tube joints shall be made by the appropriate use of cast copper alloy fittings. Flared ends of copper tube shall be of the 45-degree flare type and shall only be made with a flaring tool designed specifically for that purpose.

G. Press connections: Copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.

H. Pipe Protection: Provide protection against abrasion where copper tubing is in contact with other building members by wrapping with an approved tape, pipe insulation or otherwise suitable method of isolation.

I. Penetration Protection: Provide allowance for thermal expansion and contraction of copper tubing passing through a wall, floor, ceiling or partition by wrapping with an approved tape or pipe insulation or by installing through an appropriately sized sleeve. Penetrations for fire resistant rated assemblies shall maintain the rating of the assembly.

J. Backfill Material: Backfill material shall not include any ashes, cinders, refuse, stones, boulders or other materials which can damage or break the tubing or promote corrosive action in any trench or excavation in which tubing is installed.

K. Horizontal Support: Install hangers for horizontal piping in accordance with MSS-SP-69 or the following maximum spacing and minimum rod sizes.

L. Vertical Support: Vertical copper tubing shall be supported at each floor.

M. Galvanic Corrosion: Hangers and supports shall be either copper or vinyl coated to prevent galvanic corrosion between the tubing and the supporting member.

N. Seismic Restraint: In seismic areas, copper tubing shall be installed to withstand all seismic forces.

O. Piping Identification: Copper tubing systems shall be identified in accordance with the requirements of ASME A13.1.

3.5 FIELD QUALITY CONTROL

A. Water Testing: The copper tubing system shall be water tested for joint tightness. The piping system shall be filled with water. The system shall be pressurized to the maximum pressure and length of time required by the code or standard. The system shall have no leaks at the rated pressure.

B. Air Testing: The copper tubing system shall be air tested for joint tightness. The piping system shall be pressurized with air to the maximum pressure of the system or to the code or standard required minimum for the required length of time. The system shall have no leaks at the rated pressure.

3.6 CLEANING (potable water systems)

A. Disinfection: The copper hot and cold water distribution system shall be disinfected prior to being placed in service. The system shall be disinfected in accordance with AWWA C651 or the following requirements:
   1. The piping system shall be flushed with potable water until discolored water does not appear at any of the outlets.
   2. The system shall be filled with a water chlorine solution containing at least 50 parts per million of chlorine. The system shall be valved off and allowed to stand for 24 hours or the system shall be filled with a water chlorine solution containing at least 200 parts per million of chlorine. The system shall be valved off and allowed to stand for 3 hours.
   3. Following the standing time, the system shall be flushed with water until the chlorine is purged from the system.

END OF SECTION 221007

SECTION 22 1114-- NATURAL GAS SYSTEMS

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 22 0501 apply to this Section.

4.2 SUMMARY

A. Furnish and install gas piping and fittings within building including connection to meter.

4.3 QUALITY ASSURANCE

A. Qualifications:
   1. Welders shall be certified and bear evidence of certification 30 days prior to commencing work on project. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.

PART 5 - PRODUCTS

5.1 PIPE

A. Meet requirements of ASTM A 53-89a, "Specification for Pipe, Steel, Black & Hot-Dipped Zinc-Coated Welded & Seamless".

B. Carbon steel, butt welded, Schedule 40 black steel pipe.

5.2 FITTINGS

A. Black Pipe:
   1. Welded forged steel fittings meeting requirements of ASTM A 234-89a, "Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures", or standard weight malleable iron screwed.

5.3 VALVES

A. 125 psi bronze body ball valve, UL listed

B. Approved Manufacturers & Models:
   1. ConBraCo - "Apollo" series 80-100
   2. Jenkins - FIG-30-A
   3. Jomar - Model T-204
   4. McDonald - 3410
   5. PGL Corp - "Red Cap" gas ball valve
   6. Watts - Model B-6000-UL

5.4 PRESSURE REDUCING REGULATORS

A. Self- operated, spring loaded regulator with large diaphragm area.

B. Internal registration and relief.

C. Tamper-resistant adjustment with corrosion resistance brass for indoor or outdoor use.

D. ½″ to 1 ½ ″ Threaded NPT.

E. 2″ and Above Flanged.

F. Max Inlet Pressure 10 psi., Max Outlet Pressure 0.5 psi.

G. Temperature Capabilities - ~20 to 180° F.

H. Install with manual shut off cock.

I. Approved Manufactures and Models.
   1. Emerson Y600 AR.
   2. Maxitrol 3UP33.
   3. Or Approved Equal.

PART 6 - EXECUTION

6.1 INSTALLATION

A. Pipe installed underground, through air plenums, in walls, and pipes 2-1/2 inches and larger shall have welded fittings and joints. Other pipe may have screwed or welded fittings.

B. Wrap and lay underground pipe in accordance with local gas utility company regulations and specifications.

C. Install gas cocks on lines serving boilers, furnaces, duct heaters, and water heaters adjacent to boiler, furnace, or heater on outside of boiler, furnace, or heater cabinet and easily accessible.

D. Do not use flexible pipe connections to boilers, furnaces, duct heaters, or hot water heaters.

E. Install dirt leg with pipe cap, 6 inches long minimum, on each vertical gas drop to heating equipment.

F. Use fittings for changes of direction in pipe and for branch runouts.

G. Paint exterior exposed gas piping with gray paint to match gas meter.

END OF SECTION 22 1114

SECTION 221116 – POTABLE WATER PIPING SYSTEMS (COPPER)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter.

B. Perform excavating and backfilling required by work of this Section.

1.3 SUBMITTALS

A. Quality Control:
   1. Submit written report of sterilization test to Architect.

PART 2 - PRODUCTS

2.1 PIPE

A. Type K copper for piping underground or beneath concrete slab. 3/4 inch minimum under slabs.

B. Type L hard drawn copper for above ground applications.

2.2 FITTINGS

A. Wrought copper.

2.3 **CONNECTIONS**:

A. Sweat copper type with 95/5 or 96/4 Tin-Antimony solder. Victaulic copper connection system with “FS” flush-seal gasket and zero-flex couplings.

B. Joints under slabs, if allowed by local codes, shall be brazed.

2.4 BALL VALVES

A. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below. Valves shall be for 150 PSI SWP.

B. Approved Manufacturers:
   1. Nibco-Scott T595 or S595 or equal by
   2. ConBraCo (Apollo)
   3. Crane
   4. Hammond
   5. Jenkins
   6. Ohio Brass
   7. Stockham

8. Walworth
9. Watts
10. Victaulic

2.5 STOP & WASTE VALVES

A. Approved Manufacturers:
   1. Mark II Oriseal stop & waste valve H15134 by Mueller
   2. Buffalo screw type curb box H-10350 complete with lid and H-10349 enlarged base by Mueller.

2.6 COMBINATION PRESSURE REDUCING VALVE/STRAINER

A. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.

B. Built-in thermal expansion bypass check valve.

C. Approved Manufacturers:
   1. Watts U5B or equal by
   2. Cash Valve
   3. Clayton Valve
   4. Spencer
   5. Thrush
   6. Wilkins

2.7 DOMESTIC WATER PRESSURE REGULATOR

A. Bronze body

B. Bronze trim

C. Heat resistant seat and diaphragm

D. Built-in monel strainer with separate cleanout plug

E. Stainless steel body seat

F. Screwed ends.

G. Install with manual shutoff valve on each side and 3/4" bypass line with gate valve.

H. Provide 0-200 psi pressure gauge on each side.

I. Approved Manufacturers:
   1. Cash-Acme Type E
   2. or approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping under slabs without joints where possible.

B. Locate cold water lines a minimum of 6 inches from hot water line.

C. Run main water pipe and branches to all fixtures.

D. Size piping as shown.

E. Run piping direct and concealed from view, unless otherwise shown.

F. Grade horizontal runs to allow for drainage.

G. Provide sufficient drains to draw water from entire domestic water system and sections thereof where cutoffs are shown.

H. Furnish and install complete hot and/or cold water to all fixtures as shown on drawings.

I. Run lines parallel to each other and parallel with the lines of the building.

J. Cut pipes accurately to required measurements and work into place without springing or forcing.

K. Provide for expansion and contraction of piping.

L. Paint exposed threads on underground piping one coat asphaltum varnish.

3.2 FIELD QUALITY CONTROL

A. Before pipes are covered, test systems in presence of Architect at 100 psi hydrostatic pressure for two hours and show no leaks.

B. Sterilize potable water system with solution containing 250 parts per million minimum of available chlorine. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.

C. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.

D. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

END OF SECTION 221116

SECTION 22 1116-- POTABLE WATER PIPING SYSTEMS (PEX)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ASTM F877 cross-linked polyethylene (PEX) tubing hot and cold water distribution systems, ASTM F876 cross-linked polyethylene (PEX) tube, ASTM F1807 fittings and ASTM F2159 fittings

1.2 REFERENCES

A. ASTM International
1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM F876 Standard Specification for Cross-linked Polyethylene (PEX) Tubing.
3. ASTM F877 Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems
4. ASTM F1807 Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing
5. ASTM F2159 Standard Specification for Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing

B. National Sanitation Foundation (NSF)
1. Standard 14 Plastics Piping System Components and Related Materials
2. Standard 61 Drinking Water System Components – Health Effects

C. International Code Council (ICC)
1. International Mechanical Code
2. International Plumbing Code

D. International Association of Plumbing Officials (IAPMO)
1. Uniform Plumbing Code
2. Uniform Mechanical Code

E. Plastic Pipe Institute (PPI)
1. Technical Report TR-3 Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.
2. Technical Report TR-4 Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Piping and Fitting Compounds

1.3 SYSTEM DESCRIPTION

A. A. Design Requirements
1. Standard Grade hydrostatic pressure ratings from the Plastic Pipe Institute in accordance with TR-3 and listed in TR-4. The following three standard-grade hydrostatic ratings are required;
   a. 200 degrees F at 80 psi
   b. 180 degrees F at 100 psi
   c. 73 degrees F at 160 psi
2. Tubing tested in general accordance with ASTM E84 for a flame spread/smoke developed index of 25/50 or less for the following PEX tube sizes encased with ½ inch fiberglass insulation;
   a. 1 ¼ inch
   b. 1 ½ inch
   c. 2 inch
3. Tubing tested in general accordance with ASTM E84 for a flame spread/smoke developed index of 25/50 or less for the following PEX tube sizes;
   a. 3/8 inch
   b. ½ inch
   c. 5/8 inch

d. ¾ inch
e. 1 inch

B. Performance Requirements
1. To provide a PEX tubing hot and cold potable water distribution system, which is manufactured, fabricated and installed to comply with regulatory agencies and to maintain performance criteria stated by the PEX tubing manufacturer without defects, damage or failure
a. Comply with NSF Standard 14
b. Comply with NSF Standard 61
c. Show compliance with ASTM F877

1.4 SUBMITTALS

A. General
1. Upon request, submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section

B. Product Data
1. Upon request, submit manufacturer's product submittal data and installation instructions
2. Upon request, submit manufacturer's Professional Installation Limited Warranty

C. Shop Drawings
1. Upon request, provide installation drawings indicating tubing layout, manifold locations, plumbing fixtures supported and schedules with details required for installation of the system

D. Samples
1. Upon request, submit selection and verification samples of piping

E. Listing Certifications
1. Upon request, submit manufacturers third party listings

1.5 QUALITY ASSURANCE

A. Installer Qualifications
1. Utilize an installer having demonstrated experience on projects of similar size and complexity and possesses the skills and knowledge to install a PEX potable water distribution system
2. Installer will utilize skilled workers holding a trade qualification license or equivalent or apprentices under the supervision of a licensed tradesperson

B. Pre-installation Meetings
1. Verify project timeline requirements
2. Manufacturer's installation instruction
3. Manufacturer's warranty requirements

1.6 DELIVERY, STORAGE AND HANDLING

A. General
1. Comply with Division 1 Product Requirement Section

B. Delivery
1. Deliver materials in manufacture's original, unopened, undamaged containers with identification labels intact until ready for installation

C. Storage and Protection
1. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer
2. Store PEX tubing indoors, in cartons or under cover to avoid dirt or foreign material from entering the tubing

3. Do not expose PEX tubing to direct sunlight for more than six months. If construction delays are encountered, cover the tubing that is exposed to direct sunlight

1.7 WARRANTY

A. Project Warranty
   1. Refer to Conditions of the Contract for project warranty provisions

B. Manufacturer's Warranty
   1. Shall cover the repair or replacement of properly installed tubing and fittings proven defective as well as incidental damages
   2. Warranty period for PEX tubing and subsequent system shall be 25 year non-prorated warranty against failure due to defect in material or workmanship, beginning with the date of installation
   3. It is the installer's responsibility to avoid mixing fittings manufactured by others as it will reduce the owner's warranty

PART 2 - PRODUCTS

2.1 PRODUCT MANUFACTURERS

A. Zurn

B. Uponor

C. Vanguard

D. Rehau

E. Viega

2.2 MATERIALS

A. Tubing
   1. Cross-linked polyethylene (PEX).
   2. Non-barrier type.
      a. Shall have a pressure and temperature rating of 160 PSI at 73°F, 100 PSI at 180°F and 80 PSI at 200°F.
      b. Tubing shall have a minimum of 6 months UV protection.
   3. Manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third-party agency.

B. Fittings
   1. Manufactured in accordance with ASTM F1807 or ASTM F2159 and/or comply with ASTM F877 system standard as identified on the fitting

C. Manifold
   1. Preassembled Manifold
   2. Copper Manifold System
   3. Multi Port Fittings
   4. Copper Manifold Header

D. Valves
   1. Shall be of the metal type, meeting the requirements of ASTM F877, identified as such with the appropriate mark on the product

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. A. Comply with manufacture's product data, including product technical bulletins, technical memo's, installation instructions and design drawings.

3.2 EXAMINATION

A. Site Verification of Conditions
   1. Verify that site conditions are acceptable for the installation of the PEX potable water system
   2. Do not proceed with installations of the PEX potable water system until unacceptable conditions are corrected

3.3 INSTALLATION

A. Install PEX tubing in accordance with tubing manufacturer's recommendations and as indicated in the PEX Plumbing Installation Guide

B. Do not install PEX tubing within 6 inches of gas appliance vents or within 12 inches of any recessed light fixtures

C. Do not solder within 18 inches of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections

D. Ensure no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tubing manufacturer

E. Do not expose PEX tubing to direct sunlight for more than 6 months

F. Use grommets or sleeves at the penetration for PEX tubing passing through metal studs

G. Use a PEX manufacturer recommended fire stop sealant manufacturer

H. Protect PEX tubing with sleeves where abrasion may occur

I. Use nail plates where PEX tubing penetrates wall stud or joists and has the potential for being struck with a screw or nail

J. Allow slack of approximately 1/8 inch per foot of tube length to compensate for expansion and contraction

K. Minimum horizontal supports are to be installed not less than 32 inches between hangers in accordance with model plumbing codes.

L. Pressurize PEX tubing in accordance with applicable codes or in the absence of applicable codes, test pressure shall be at least equal to normal system working pressure, but not less than 40 PSI water or air and not greater than 225 PSI water, 125 PSI air

3.4 FIELD QUALITY CONTROL

A. Site Tests
   1. To ensure system integrity, pressure test the system before covering tubing in concrete and after other trades have worked in the vicinity of the tubing
   2. Repair and replace any product that has been damaged according to manufacturer's recommendation

3.5 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site

END OF SECTION 22 1116

22 1217 - GAS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 22 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install gas piping, manifolds and equipment within building.

B. Install owner furnished air compressor.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. All piping shall be “pickled” and cleaned with caustic soda. Testing and certification of piping for actual flow and use shall be completed by a certified gas consultant.

PART 2 - PRODUCTS

2.1 PIPE

A. Type K or Type L copper tubing with brazed joints per NFPA 99.

B. Oxygen, Carbon Dioxide, Propylene, Argon and Compressed Air piping. Piping shall be Type “K” copper tubing with wrought copper solder fittings. Solder with Sivaloy, Streamline 122, Phos-Copper, Sil-Fos, or approved equal silver solder. Pipe to be “pickled” and cleaned with caustic soda. Use flux and prepare joint in accordance with solder manufacturer’s recommendations. Installation shall be in accordance with NFPA latest pamphlets. Testing and certification of piping for actual flow and use required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. After installation of piping and outlets, provide a certified pipeline system check to certify there are no cross connections. The system certification, in accordance with NFPA 99.

END OF SECTION 22 1217

SECTION 22 1313 – SOIL, WASTE, & VENT PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.

B. Perform excavation and backfill required by work of this Section.

PART 2 - PRODUCTS

2.1 BURIED LINES

A. Service weight, single-hub type cast iron soil pipe and fittings meeting requirements of ASTM A 74-87, "Specification for Cast Iron Soil Pipe & Fittings".
   1. Joint Material:
      a. Rubber gaskets meeting requirements of ASTM C 564-88, "Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings".
      b. No hub stainless steel clamps with neoprene gasket.

B. ABS-DWV or PVC-DWV plastic waste pipe and fittings as permitted by state and local plumbing code.

2.2 ABOVE GRADE PIPING & VENT LINES

A. Same as specified for buried lines except no-hub pipe may be used.

B. Vent lines 2-1/2 inches or smaller may be Schedule 40 galvanized steel.

C. Joint Material:
   1. Bell & Spigot Pipe - rubber gaskets meeting requirements of ASTM C 564-88, "Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings".
   2. No-Hub Pipe - Neoprene gaskets with stainless steel cinch bands.
   3. Galvanized Pipe - Screwed Durham tarred drainage fittings, or Victaulic.
   4. ABS-DWV solvent weld fittings

2.3 TRAP PRIMERS

A. Components:
   1. Drains And Drain Accessories:
      a. Floor Drains:
         1) Approved types with deep seal trap and chrome plated strainer.
         2) Provide trap primer connection and trap primer equal to Sioux Chief 695-01.
            a) Josam: 30000-50-Z-5A.
            b) J. R. Smith: 2010-A.
            c) Sioux Chief: 832.
            d) Wade: 1100.
            e) Watts: FD-200-A.
            f) Zurn: Z-415.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not caulk threaded work.

B. Slope horizontal pipe at 1/4 in/ft.

C. Cleanouts:
   1. Provide and set full size cleanouts at foot of each riser, and ends of branches from toilets, at points where a change of direction occurs, on exposed and accessible traps, at points where required to remove rust accumulation or other obstructions and as shown on plans. Set screw cap in cleanout with graphite paste. Cleanouts in walls shall be flush and covered with a chrome plated cleanout cover screwed into the cleanout plug. Cleanouts in floors shall be flush using Zurn, Josam, or Wade floor level cleanout fittings. Location of all cleanouts subject to approval of inspector.

D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or syphon condition on water seal.

E. Vent entire waste system to atmosphere. Discharge 14 inches above roof. Join lines together in fewest practicable number before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley.

F. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

G. Flash pipes passing through roof with 16 oz sheet copper flashing fitted snugly around pipes and calk between flashing and pipe with flexible waterproof compound. Flashing base shall be at least 24 inches square.
   1. Flashing may be 4 lb per sq ft lead flashing fitted around pipes and turned down into pipe 1/2 inch with turned edge hammered against pipe wall.

H. Trap seals are allowed in place of trap primers if allowed by Authority Having Jurisdiction.

3.2 FIELD QUALITY CONTROL

A. Before piping is covered, conduct tests for leaks and defective work. Notify Architect prior to testing. Correct leaks and defective work. Fill waste and vent system to roof level with water, 10 feet minimum, and show no leaks for two hours.

END OF SECTION 22 1313

SECTION 22 2600 - CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
1. Furnish and install condensate drain piping as described in Contract Documents.

B. Related Requirements:
1. Section 23 0501: Common HVAC Requirements.

1.2 REFERENCES

A. Reference Standards:
1. ASTM International:
a. ASTM B 88-03, 'Standard Specification for Seamless Copper Water Tube.'

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Materials:
1. Condensate Drains:
a. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils, and auxiliary drain pans.

B. Manufactured Units
1. Condensate Pump
a. Rated at 225 gph at 15 feet total head. Complete with one gallon polystyrene tank with pump and automatic float control. 1/5 hp, 120 V, one phase, 60 Hertz.
b. Condensate piping shall be Type M copper or Schedule 40 PVC.
c. Approved Manufacturers -
1) No. CU551UL by Beckett Pumps, (888) 232-5388
2) No. VCL45S by Little Giant Pump Co, Oklahoma City, OK (405) 947-2511

PART 3 - EXECUTION

3.1 INSTALLATION

A. Condensate Drains:
1. Support piping and protect from damage.
2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.
3. Do not combine auxiliary drain pan piping with furnace / Cooling Coil Condensate drain piping.

END OF SECTION 22 2600

SECTION 22 3330 – ELECTRIC STORAGE TYPE WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 22 05 00 apply to this Section.

1.2 SUMMARY

A. Furnish and install water heater as specified in Contract Documents.

1.3 SUBMITTALS

A. Warranty:
   1. Submit copy of specified warranty.

1.4 WARRANTY

A. Three year non-prorated warranty on water heaters of 20 gallon capacity and larger.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Glass lined storage tank pressure tested and rated for 125 PSI working pressure.

B. 40 and 50 Gallon - (Regular Height)
   1. (2) 4.5 Kw non-simultaneous operation.
   2. 3 inches minimum glass fiber insulation.
   3. Complete with two stage thermostat, magnesium anode, electric sheath rod type heating element, high limit control, and ASME rated temperature-pressure relief valve.
   4. Heater shall be pre-wired and entire unit bear UL label.
   5. Maximum Height - 50 inches.
   6. Approved Manufacturers:
      a. A O Smith
      b. State Industries
      c. Ruud/ Rheem
      d. Bradford/White
      e. PVI

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water heaters shall each have a temperature-pressure relief valve sized to match heat input and set to relieve at 120 psi.

B. Install temperature-pressure relief valve rated at MBH input of heater minimum on hot water heater and pipe discharge to directly above funnel of floor drain.

C. Thermal Expansion Absorbers.
   1. Bladder type for use with potable water systems.
   2. Acceptable Products:
      a. Therm-X Trol ST-5 by Amtrol
      b. Equal as approved by Architect before bidding.

3.2 WATER TEMPERATURE

A. Contractor shall be responsible to verify and/or change temperature settings on water heaters supplied on this project to meet requirements of Life Safety and Health Department Codes. Any setting above 120 deg. F. shall require warning labels placed on outside of water heaters in conspicuous places indicating water temperature setting and fact that any temperature above 120 deg. F. may be a hazard.

END OF SECTION 22 3330

SECTION 22 3500 – KITCHEN EQUPIMENT CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

1.2 SUMMARY

A. Furnish and install materials and labor necessary to make all required steam, hot water, cold water, waste, and vent rough-ins and to make all final connections for kitchen equipment as described in Contract Documents.

B. Kitchen equipment, unless specifically noted otherwise, shall be furnished by Kitchen Equipment Contractor.

C. Kitchen Equipment Contractor shall provide complete roughing-in drawings showing exact location of stub-ups in floor and in walls. It will be Plumbing Contractor's responsibility to install all sleeves through walls and floor and to connect all plumbing services. Floors shall be core drilled. Plumbing Contractor shall request this roughing-in information well in advance of installation of equipment.

D. Each hot water, cold water, and steam connection to kitchen equipment shall include a valve and union and shall be capped for connection after equipment has been installed.

E. Pipe sleeves shall be installed where piping rises through floors and shall be caulked with waterproof compound.

F. Kitchen Equipment Contractor shall provide and install all kitchen equipment, including faucets and sink wastes, swing faucets at kettles and ranges, strainers, and tailpieces.

G. Plumbing Contractor shall provide cold water and hot water services, all interconnection pipes, vacuum breakers, traps, etc., and shall make all final connections.

H. Plumbing contractor shall provide a pressure reducing valve at hot water connection to dishwasher.

END OF SECTION 22 3500

SECTION 22 4001 – PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install plumbing fixtures as described in Contract Documents.

B. Before fixtures are ordered, the Contractor shall submit a complete list of plumbing fixtures, giving the catalog number, cut and make, for approval. Fixtures shall not be ordered until this list is approved.

PART 2 - PRODUCTS

2.1 GENERAL

A. Interior exposed pipe, valves, and fixture trim shall be chrome plated.

B. Do not use flexible water piping.

C. Flow Control Fittings:
   1. Vandal proof type and fit faucet spout of fixture used. Flow shall be controlled as required by local codes.

D. Furnish and install the necessary plumbing fixtures in quantity as shown on plans. Provide all necessary valves, chrome plated 17 gauge or cast "P" traps, stops with risers, fittings, and accessories to make the job complete with the fixtures specified on the drawings. Exposed stops to be equal to Brasscraft with compression inlet, chrome plated nipples, cross handles, ¼ turn ball valves and flexible risers.

E. Fixtures shall be PROFLO, Kohler, Crane, Briggs, Eljer, American Standard, or an approved equal. Specialties shall be Zurn, Josam, MiFab, J. R. Smith, Wade, or Watts.

F. Toilet seat manufacturers shall be Beneke, Church, Olsonite, or Bemis.

G. Carrier and wall hydrant manufacturers shall be Smith, Zurn, Wade, Josam, or Watts.

H. Stainless steel sink manufacturers shall be Elkay or Just.

I. Drinking fountain manufacturers shall be Elkay, Halsey Taylor, Haws, Cordley, Sunroc, or Oasis.

J. Pressure balance mixing valves shall be Powers, Lawler, Leonard, or Symmons.

K. Thermostatic mixing valves shall be Powers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fixtures including traps and accessories with accessible stop or control valve in each hot and cold water branch supply line.

B. Mounting – Refer to Architectural Elevations:
   1. Urinals:

a. Standard - 20 inches from floor to bottom lip.
b. Handicap - 17 inches from floor to bottom lip.

C. Make fixture floor connections with approved brand of cast iron floor flange, soldered or calked securely to waste pipe.

D. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets.

E. Caulk between fixtures and wall and floor with white butyl rubber non-absorbent caulking compound. Point edges.

F. Cleanouts: Provide and set full size cleanouts at foot of each riser, and ends of branches from toilets, at points where a change of direction occurs, on exposed and accessible traps, at points where required to remove rust accumulation or other obstructions and as shown on plans. Set screw cap in cleanout with graphite paste. Location of all cleanouts subject to approval of inspector.

G. Traps: Install "P" traps in branch lines from floor drains or where required. Traps installed in connection with threaded pipe shall be recess drainage pattern. Traps installed in connection with cast iron pipe shall be of the same quality and grade as the pipe. Traps installed in connection with fixtures shall have a seal of not less than 2" nor more than 4". Exposed traps shall be chrome plated cast brass or chrome plated 17 gauge tubular type. Provide trap primers as required by Code.

3.2 FIXTURE INSTALLATION

A. Provide stop valves and 18" minimum air chambers on all water connections to fixtures. Furnish and install wall carriers for wall mounted fixtures, wood backing, where necessary, to be installed by General Contractor at the direction of this Contractor. Provide exact locations, including proper mounting heights, obtained from details on drawings and from manufacturer's specifications. Provide hudee rims for countertop installations.

B. Interior exposed pipe, valves, and fixtures trim shall be chrome plated.

C. Complete installation of each fixture including trap and accessories with accessible stop or control valve in each hot and cold water branch supply line. Make fixture floor connections with approved brand of cast iron floor flange, soldered or caulked securely to waste pipe. Make joint between fixture and floor flange tight with approved fixture setting compound or gaskets.

D. Polish chrome finish at completion of project.

E. Caulk between fixtures and wall and floor with white butyl rubber non-absorbent caulking compound. Paint all edges.

F. Install fixtures and fittings as per local codes and manufacturer's instructions.

END OF SECTION 22 4001END OF DIVISION 22

DIVISION 23: HEATING, VENTILATING, AND AIR-CONDITIONING

END TABLE OF CONTENTS

SECTION 230501 – COMMON HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Furnish labor, materials, and equipment necessary for completion of work as described in Contract Documents.

B. It is the intent of these specifications that the systems specified herein are to be complete and operational before being turned over to the owner. During the bidding process, the contractor is to ask questions or call to the engineer's attention any items that are not shown or may be required to make the system complete and operational. Once the project is bid and the contractor has accepted the contract, it is his responsibility to furnish and install all equipment and parts necessary to provide a complete and operational system without additional cost to the owner.

C. Furnish and install fire stopping materials to seal penetrations through fire rated structures and draft stops.

D. Includes But Not Limited To:
1. General procedures and requirements for HVAC.

E. Related Sections:
1. Section 23 0593: Testing, Adjusting, and Balancing for HVAC.

1.3 SUBMITTALS

A. Substitutions: By specific designation and description, standards are established for specialties and equipment. Other makes of specialties and equipment of equal quality will be considered provided such proposed substitutions are submitted to the Architect for his approval, complete with specification data showing how it meets the specifications, at least 5 working days prior to bid opening. A list of approved substitutions will be published as an addendum.
1. Submit a single copy of Manufacturer's catalog data including Manufacturer's complete specification for each proposed substitution.
2. The Architect or Engineer is to be the sole judge as to the quality of any material offered as an equal.

B. Product Data, Shop Drawings: Within 30 days after award of contract, submit 10 sets of Manufacturer's catalog data for each manufactured item.
1. Literature shall include enough information to show complete compliance with Contract Document requirements.
2. Mark literature to indicate specific item with applicable data underlined.
3. Information shall include but not be limited to capacities, ratings, type of material used, guarantee, and such dimensions as are necessary to check space requirements.
4. When accepted, submittal shall be an addition to Contract Documents and shall be in equal force. No variation shall be permitted.
5. Even though the submittals have been accepted by the Engineer, it does not relieve the contractor from meeting all of the requirements of the plans and specifications and providing a complete and operational system.

C. Drawings of Record: One complete sets of blue line mechanical drawings shall be provided for the purpose of showing a complete picture of the work as actually installed.
1. These drawings shall serve as work progress report sheets. Contractor shall make notations neat and legible therein daily as the work proceeds.
2. The drawings shall be kept at the job at a location designated by the Mechanical Engineer.
3. At completion of the project these "as-built" drawings shall be signed by the Contractor, dated, and returned to the Architect.

D. Operating Instructions and Service Manual: The Mechanical Contractor shall prepare 2 copies of an Operation and Maintenance Manual for all mechanical systems and equipment used in this project. Manuals shall be bound in hard-backed binders and the front cover and spine of each binder shall indicate the name and location of the project. Use plastic tab indexes for all sections. Provide a section for each different type of equipment item. The following items

shall be included in the manual, together with any other pertinent data. This list is not complete and is to be used as a guide.

1. Provide a master index at the beginning of the manual showing all items included.
2. The first section of the manual shall contain:
   a. Names, addresses, and telephone numbers of Architect, Mechanical Engineer, Electrical Engineer, General Contractor, Plumbing Contractor, Sheet Metal Contractor, and Temperature Control Contractor.
   b. List of Suppliers which shall include a complete list of each piece of equipment used with the name, address, and telephone number of vendor.
   c. General Description of Systems including –
      1) Location of all major equipment
      2) Description of the various mechanical systems
      3) Description of operation and control of the mechanical systems
      4) Suggested maintenance schedule
   d. Copy of contractor's written warranty
3. Provide a copy of approved submittal literature for each piece of equipment.
4. Provide maintenance and operation literature published by the manufacturer for each piece of equipment which includes: oiling, lubrication and greasing data; belt sizes, types and lengths; wiring diagrams; step-by-step procedure to follow in putting each piece of mechanical equipment in operation.
5. Include parts numbers of all replaceable items.
6. Provide control diagram and operation sequence, along with labeling of control piping and instruments to match diagram.
7. Include a valve chart indicating valve locations.

E. Include air balance and/or water balance reports.

1.4 SUBMITTALS FOR COMMON HVAC REQUIREMENTS

A. Samples: Sealer and gauze proposed for sealing ductwork.

B. Quality Assurance / Control:
1. Manufacturer’s installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.
2. Specification data on sealer and gauze proposed for sealing ductwork.

C. Quality Assurance
1. Requirements: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA HVAC Duct Construction Standards.
2. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

1.5 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
1. Perform work in accordance with applicable provisions of local and state Plumbing Code, Gas Ordinances, and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Architect in writing of such differences.

B. Applicable Specifications: Referenced specifications, standards, and publications shall be of the issues in effect on date of Advertisement for Bid.
1. "Heating, Ventilating and Air Conditioning Guide" published by the American Society of Heating and Air Conditioning Engineers.
2. "Engineering Standards" published by the Heating, Piping, and Air Conditioning Contractors National Association.
3. "2012 International Building Code", "2012 International Mechanical Code", and "2012 International Fire Code" as published by the International Conference of Building Officials.
4. 2012 International Plumbing Code as published by the International Association of Plumbing and Mechanical Officials.
5. "National Electrical Code" as published by the National Fire Protection Association.
6. "2012 International Energy Conservation Code ".

C. Identification: Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to Owner.

1.6 INSPECTIONS AND PERMITS

A. Pay for permits, fees, or charges for inspection or other services. Local and state codes and ordinances must be properly executed without expense to Owner and are considered as minimum requirements. Local and state codes and ordinances do not relieve the Contractor from work shown that exceeds minimum requirements.

1.7 ADDITIONAL WORK:

A. Design is based on equipment as described in the drawing equipment schedule. Any change in foundation bases, electrical wiring, conduit connections, piping, controls and openings required by alternate equipment submitted and approved shall be paid for by this division. All work shall be in accordance with the requirements of the applicable sections.

PART 2 - PRODUCTS FOR COMMON HVAC REQUIREMENTS

A. Finishes, Where Applicable: Colors as selected by Architect.

B. Duct Hangers:
   1. One inch 25 mm by 18 ga 1.27 mm galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches 2 400 mm apart. Do not use wire hangers.
   2. Attaching screws at trusses shall be 2 inch 50 mm No. 10 round head wood screws. Nails not allowed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Inspection:
   1. Examine premises and understand the conditions which may affect performance of work of this Division before submitting proposals for this work.
   2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

B. Drawings:
   1. Mechanical drawings show general arrangement of piping, ductwork, equipment, etc, and do not attempt to show complete details of building construction which affect installation. This Contractor shall refer to architectural, structural, and electrical drawings for additional building detail which affect installation of his work.
      a. Follow mechanical drawings as closely as actual building construction and work of other trades will permit.
      b. No extra payments will be allowed where piping and/or ductwork must be offset to avoid other work or where minor changes are necessary to facilitate installation.
      c. Everything shown on the mechanical drawings shall be the responsibility of Mechanical Contractor unless specifically noted otherwise.
   2. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over mechanical drawings.
   3. Because of small scale of mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions. Do not scale drawings for locations of equipment or piping. Refer to large scale dimensioned drawings for exact locations.

C. Insure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.
   1. If approval is received to use other than specified items, responsibility for specified capacities and insuring that items to be furnished will fit space available lies with this Division.
   2. If non-specified equipment is used and it will not fit job site conditions, this Contractor assumes responsibility for replacement with items named in Contract Documents.

3.2 PREPARATION

A. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
   1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

2. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
3. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

3.3 INSTALLATION

A. Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

3.4 STORAGE AND PROTECTION OF MATERIALS:

A. Provide storage space for storage of materials and assume complete responsibility for losses due to any cause whatsoever. Storage shall not interfere with traffic conditions in any public thoroughfare.

B. Protect completed work, work underway, and materials against loss or damage.

C. Close pipe openings with caps or plugs during installation. Cover fixtures and equipment and protect against dirt, or injury caused by water, chemical, or mechanical accident.

3.5 EXCAVATION AND BACKFILL

A. Perform necessary excavation of whatever substance encountered for proper laying of all pipes and underground ducts.
1. Excavated materials not required for fill shall be removed from site as directed by Engineer.
2. Excavation shall be carried low enough to allow a minimum coverage over underground piping of 5'-0" or to be below local frost level.
3. Excess excavation below required level shall be backfilled at Contractor's expense with earth, sand, or gravel as directed by Engineer. Tamp ground thoroughly.
4. Ground adjacent to all excavations shall be graded to prevent water running into excavated areas.

B. Backfill pipe trenches and allow for settlement.
1. Backfill shall be mechanically compacted to same density as surrounding undisturbed earth.
2. Cinders shall not be used in backfilling where steel or iron pipe is used.
3. No backfilling shall be done until installation has been approved by the Engineer.

3.6 COOPERATION

A. Cooperate with other crafts in coordination of work. Promptly respond when notified that construction is ready for installation of work under Division 23000. Contractor will be held responsible for any delays which might be caused by his negligence or failure to cooperate with the other Contractors or crafts.

3.7 SUPERVISION

A. Provide a competent superintendent in charge of the work at all times. Anyone found incompetent shall be removed at once and replaced by someone satisfactory, when requested by the Architect.

3.8 INSTALLATION CHECK:

A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule shall visit the project to inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the project as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to the Engineer.

B. Each equipment supplier's representative shall furnish to the Owner, through the Engineer, a written report certifying the following:
1. Equipment has been properly installed and lubricated.
2. Equipment is in accurate alignment.
3. Equipment is free from any undue stress imposed by connecting piping or anchor bolts.
4. Equipment has been operated under full load conditions.
5. Equipment operated satisfactorily.

C. All costs for this installation check shall be included in the prices quoted by equipment suppliers.

3.9 CLEANING EQUIPMENT AND PREMISES

A. Properly lubricate equipment before Owner's acceptance.

B. Clean exposed piping, ductwork, equipment, and fixtures. Repair damaged finishes and leave everything in working order.

C. Remove stickers from fixtures and adjust flush valves.

D. At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.

E. Trap elements shall be removed during cleaning and flushing period. Replace trap elements and adjust after cleaning and flushing period.

3.10 TESTS

A. No piping work, fixtures, or equipment shall be concealed or covered until they have been inspected and approved by the inspector. Notify inspector when the work is ready for inspection.

B. All work shall be completely installed, tested as required by Contract Documents and the city and county ordinances and shall be leak-tight before the inspection is requested.

C. Tests shall be repeated to the satisfaction of those making the inspections.

D. Water piping shall be flushed out, tested at 100 psi and left under pressure of supply main or a minimum of 40 psi for the balance of the construction period.

3.11 WARRANTEE

A. Contractor shall guarantee work under Division 23 to be free from inherent defects for a period of one year from acceptance.
   1. Contractor shall repair, revise or replace any and all such leaks, failure or inoperativeness due to defective work, materials, or parts free of charge for a period of one year from final acceptance, provided such defect is not due to carelessness in operation or maintenance.
   2. In addition, the Contractor shall furnish all refrigeration emergency repairs, emergency service and all refrigerant required due to defective workmanship, materials, or parts for a period of one year from final acceptance at no cost to the Owner, provided such repairs, service and refrigerant are not caused by lack of proper operation and maintenance.

B. In addition to warrantee specified in General Conditions, heating, cooling, and plumbing systems are to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

3.12 SYSTEM START-UP, OWNER'S INSTRUCTIONS

A. Off-Season Start-up
   1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
   2. Notify Owner 7 days minimum before scheduled start-up.
   3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
   4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.

B. Owner's Instructions
   1. Instruct building maintenance personnel and Owner Representative in operation and maintenance of mechanical systems utilizing Operation & Maintenance Manual when so doing.
   2. Minimum instruction periods shall be as follows –
      a. Mechanical - Four hours.
      b. Temperature Control - Four hours.
   3. Instruction periods shall occur after Substantial Completion inspection when systems are properly working and before final payment is made.
   4. None of these instructional periods shall overlap another.

3.13 PROTECTION

A. Do not run heat pump, air handling units, fan coil units, or other pieces of equipment used for moving supply air without proper air filters installed properly in system.

B. The mechanical systems are not designed to be used for temporary construction heat. If any equipment is to be started prior to testing and substantial completion, such equipment will be returned to new condition with full one year warranties, from date of substantial completion after any construction use. This includes, but is not necessarily limited to: Equipment, filters, ductwork, fixtures, etc.

3.14 **COMMON HVAC REQUIREMENTS**:

A. INSTALLATION
1. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
2. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.
3. Hangers And Supports:
   a. Install pair of hangers close to each transverse joint and elsewhere as required by spacing indicated in table on Drawings.
   b. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
   c. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
   d. Where hangers are secured to forms before concrete slabs are poured, cut off flush all nails, strap ends, and other projections after forms are removed.
   e. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

B. **CLEANING**
1. Clean interior of duct systems before final completion.

END OF SECTION 230501

SECTION 23 0502 - DEMOLITION AND REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Under this section remove obsolete piping and mechanical equipment and relocate, reconnect or replace existing piping affected by demolition or new construction. Remove concealed piping abandoned due to demolition or new construction, or cap piping flush with existing surfaces.

1.3 DRAWINGS AND EXISTING CONDITIONS

A. All relocations, reconnections and removals are not necessarily indicated on the drawings. As such, the Contractor shall make adequate allowance in his proposal for this work as no extra charges will be allowed for these items.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 TEMPORARY CONNECTIONS

A. Where existing piping must remain in service to supply occupied areas during construction, provide temporary piping, connections, and equipment to maintain service to such areas. All shall be performed in a neat and safe manner to prevent injury to the building or its occupants.

3.2 EXISTING TO BE ABANDONED

A. All required drilling, cutting, block-outs and demolition work required for the removal and/or installation of the mechanical system is the responsibility of this Contractor.

B. No joists, beams, girders, trusses or columns shall be cut by any Contractor without written permission from the Architect.

C. The patching, repair, and finishing to existing or new surfaces is the responsibility of this Contractor, unless specifically called for under sections of specifications covering these materials.

D. Disconnect all equipment that is to be removed or relocated. Relocate any existing equipment that obstructs new construction.

3.3 EXISTING TO REMAIN IN USE

A. Where affected by demolition or new construction, relocate, replace, extend, or repair piping and equipment to allow continued use of same. Use methods and materials as specified for new construction.

3.4 MATERIALS AND EQUIPMENT REMOVED

A. All obsolete materials, piping, and equipment shall become the property of the Contractor and be removed from the site promptly.

END OF SECTION 23 0502

SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install identification of equipment and piping as described in Contract Documents.

B. Mechanical Contractor shall touch-up equipment where factory paint has been damaged. Repaint entire item where more than 20 percent of the surface is involved.

C. Primary painting of walls, ceilings, ductwork, piping and plenums is covered in the general painting section of these Contract Documents.

PART 2 - PRODUCTS

2.1 PAINT

A. Benjamin Moore Impervo or equivalent by Paint Manufacturer approved in Section 09 900.

B. Use appropriate primer.

2.2 LABELS

A. Black Formica with white reveal on engraving.

2.3 CODED BANDS

A. Using colored bands and arrows to indicate supply and return, with colored reflective tape, color code all piping installed in this contract at not more than 20-foot intervals, at equipment, at walls, etc., in accordance with ANSI Standards.

B. Approved Manufacturers:
   1. Seton
   2. Craftmark

2.4 PIPE IDENTIFICATION

A. In addition to the colored bands, stencil with black paint in 1/2 inch high letters a symbol and directional arrow for all fluids handled or use Seaton coded and colored pipe markers and arrows to meet ANSI Standards.

2.5 EQUIPMENT IDENTIFICATION

A. Provide an engraved plastic plate for each piece of equipment stating the name of the item, symbol number, area served, and capacity. Label all control components with plastic embossed mechanically attached labels. Sample:
   1. Supply Fan SF-1 - North Classrooms
   2. 10,000 CFM @ 2.5"

2.6 VALVE IDENTIFICATION

A. Make a list of and tag all valves installed in this work.
   1. Valve tags shall be of brass, not less than 1"x2" size, hung with brass chains.
   2. Tag shall indicate plumbing or heating service.

PART 3 - EXECUTION

3.1 APPLICATION

A. Engraved Plates:
1. Identify thermostats and control panels in mechanical rooms, furnaces, boilers and hot water heating specialties, duct furnaces, air handling units, electric duct heaters, and condensing units with following data engraved and fastened to equipment with screws –
   a. Equipment mark noted on Drawings (i.e., SF-1)
   b. Area served (i.e., North Classrooms)
   c. Capacity (10,000 CFM @ 2.5)

B. Stenciling:
1. Locate identifying legends and directional arrows at following points on each piping system –
   a. Adjacent to each item of equipment and special fitting.
   b. At point of entry and exit where piping goes through wall.
   c. On each riser and junction.
   d. Every 50 feet on long continuous lines.
2. Hot Water Heating, Chilled Water, Gas, & Valve Identification –
   a. Identify specific pipe contents by stenciling pipe with written legend and placing of arrows to indicate direction of flow.

C. Painting:
1. Background Color - Provide by continuous painting of piping.

Symbol	Name	Color
HWH	Hot Water Heating	Green
FS	Fire Sprinkler	Red

2. Identification stenciling and flow arrows shall be following colors for proper contrast:

Arrows & ID Stenciling	Color Shade of Pipe
White	Red, Grays, & black
Black	Yellows, Oranges, Greens, & White

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Division 23 0501 - Common HVAC Requirements and Basic Mechanical Materials and Methods Sections apply to work of this section.

1.2 SUMMARY SCOPE

A. This Section includes TAB to produce design objectives for the following:
   1. Air Systems.
      a. Rooftop Units
      b. Fan Powered VAV Boxes
      c. VAV Boxes.
      d. Make-Up Air Units
      e. Exhaust Fans.
   2. Hydronic Piping Systems.
      a. Fan Powered VAV Box Coils
      b. VAV Coils
      c. Cabinet Unit Heater

1.3 SUBMITTALS

A. Agency Data:
   1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below. The firm or individuals performing the work herein specified may not be the installing firm.

B. Engineer and Technicians Data:
   1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC or NEBB are proposed.

E. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below.
   1. Draft Reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
   2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 4 complete sets of final reports.
   3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
      a. General Information and Summary
      b. Air Systems
      c. Temperature Control System Verification.

F. Report Contents: Provide the following minimum information, forms, and data:

1. General information and Summary: Inside cover sheet to identify testing, adjusting, balancing agency, Contractor, Owner, Engineer, and Project. Include addresses and contact names and telephone numbers. Also include a certification sheet containing the seal and name, address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures along with the instrument calibration sheet.
2. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC or NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form. The report shall contain the following information, and all other data resulting from the testing, adjusting, and balancing work:
   a. All nameplate and specification data for all air handling equipment and motors.
   b. Actual metered running amperage for each phase of each motor on all pumps and air handling equipment.
   c. Actual metered voltage at air handling equipment (phase-to-phase for all phases).
   d. Fan RPM for each piece of air handling equipment.
   e. Total actual CFM being handled by each piece of air handling equipment.
   f. Actual CFM of systems by rooms.
3. Certify that all smoke and fire dampers operate properly and can be reset under actual system operating conditions.

G. Calibration Reports:
1. Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.4 CERTIFICATION

A. Agency Qualifications:
1. Employ the services of a certified 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, recording and reporting the results, and operation of all systems to demonstrate satisfactory performance to the owner.
2. The testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project, and having at least one person certified by NEBB or AABC as a Test and Balance supervisor, and a registered professional mechanical engineer, licensed in the state where the work will be performed.

B. Codes and Standard:
1. NEBB: “Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.”
2. AABC: “National Standards for Total System Balance.”
3. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

1.5 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operation and clean prior to beginning procedures.

1.6 SEQUENCING AND SCHEDULING

A. Test, adjust, and balance the air systems before hydronic, steam, and refrigerant systems within +10% to -5% of contract requirements.

B. The report shall be approved by the Engineer. Test and balance shall be performed prior to substantial completion.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps.
1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.

3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness and to determine if they are the type specified.
6. Check dampers (both volume and fire) for correct and locked position. Check automatic operating and safety controls and devices to determine that they are properly connected, functioning, and at proper operating setpoint.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a cross-check with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "As-Built" ductwork and piping layouts to facilitate reporting.
11. Lubricate all motors and bearings.
12. Check fan belt tension.
13. Check fan rotation.

3.2 PROCEDURES FOR HYDRONIC SYSTEMS

A. Measure water flow at pumps. Use the following procedures, except for positive-displacement pumps:
   1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
   2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
   3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
   4. Report flow rates that are not within plus or minus 5 percent of design.

B. Set calibrated balancing valves, if installed, at calculated presettings.

C. Measure flow at all stations and adjust, where necessary, to obtain first balance.
   1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

D. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

E. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
   1. Determine the balancing station with the highest percentage over indicated flow.
   2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
   3. Record settings and mark balancing devices.

F. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.

G. Measure the differential-pressure control valve settings existing at the conclusions of balancing.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5%. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all readings with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards. Balancing of the air systems and hydronic systems shall be achieved by adjusting the automatic controls, balancing valves, dampers, air terminal devices, and the fan/motor drives within each system.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Adjust timing relays of environmental equipment motor reduced voltage starters to the optimum time period for the motor to come up to the maximum reduced voltage speed and then transition to the full voltage speed to prevent damage to motor, and to limit starting current spike to the lowest possible and practical.

G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

H. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

C. Report shall be certified and stamped by a registered professional mechanical engineer employed by the agency and licensed in the state where the work will be performed.

D. Engineer is to provide a floor plan and test and balance contractor to include the plan in test and balance report and identify actual cfm on drawing or number the diffusers to match report.

3.6 DEMONSTRATION

A. If requested, testing, adjusting, and balancing agency shall conduct any or all of the field tests in the presence of the engineer.

B. Agency shall include a maximum of one (1) call back to the project within the one year warranty period to make additional adjustments if requested by the engineer.

END OF SECTION 230593

SECTION 230712 - MECHANICAL INSULATION AND FIRE STOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install mechanical insulation and fire stopping as described in Contract Documents including but not limited to the following:
   1. Ductwork Insulation
   2. Heating Piping Insulation
   3. Fire Stopping

1.3 QUALITY ASSURANCE

A. Insulation shall have composite (insulation, jacket or facing and adhesive used to adhere facing or jacket to insulation) fire and smoke hazard ratings as tested by Procedure ASTM E-84, NFPA 255 and UL 723 not exceeding: Flame Spread of 25 and Smoke Developed of 50.

B. Insulation Contractor shall certify in writing, prior to installation, that all products to be used will meet the above criteria.

C. Accessories, such as adhesives, mastics, cements, and tapes, for fittings shall have the same component ratings as listed above.

D. Products, or their shipping cartons, shall bear a label indicating that flame and smoke ratings do not exceed above requirements.

E. Any treatment of jacket or facings to impart flame and smoke safety shall be permanent.

F. The use of water-soluble treatments is prohibited.

END OF SECTION 230712

SECTION 23 0714 – PREREMOLDED ONE PIECE PVC FITTINGS INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install premolded one piece PVC fittings insulation as described in Contract Documents.

1.3 QUALITY ASSURANCE

A. Fittings shall be UL rated 25/50 PVC.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Approved Manufacturers:
   1. Zeston

PART 3 - EXECUTION

3.1 INSTALLATION

A. Where factory premolded one piece PVC insulating fitting covers are to be used, proper factory precut Hi-Lo Temp insula tion shall be applied to the fitting. Ends of Hi-Lo Temp insulation shall be tucked snugly into throat of fitting and edges adjacent to pipe covering tufted and tucked in. Fully insulate pipe fittings. One piece PVC fitting cover is then secured by stapling, tack fastening, banding or taping ends to adjacent pipe covering.

B. Cold:
   1. Chilled water systems shall be insulated as "A" above and have all seam edges of cover sealed with Zeston's vapor barrier adhesive or equal.
   2. Circumferential edges of cover shall be wrapped with Zeston's vapor barrier pressure sensitive color matched Z tape.
   3. Tape shall extend over adjacent pipe insulation and have an overlap on itself at least 2" on downward side.

C. Hot:
   1. On fittings where temperature exceeds 250 degrees F., two layers of factory precut Hi-Lo Temp insulation inserts shall be applied with a few wrappings of twine on first layer, to be sure there are no voids or hot spots. Fitting cover shall then be applied over Hi-Lo Temp insulation as described above in "A."

END OF SECTION 23 0714

SECTION 230715 – HOT AND CHILLED WATER SUPPLY & RETURN PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install insulation on piping mains, branches, risers, fittings, and valves, pump bodies and flanges as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIAL

A. 6 lb./cu.ft. heavy density fiberglass with fire retardant vapor barrier jacket with self sealing laps. Thickness shall be 1-1/2 inches on heating supply and return lines.

B. Approved Manufacturers:
   1. Owens-Corning Fiberglass heavy density with ASJ-SSL jacket
   2. Equals by Johns-Manville or CTM.
   3. Zeston covers for valves and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pipes:
   1. Install in accordance with manufacturer's directions on clean dry pipes.
   2. Butt joints firmly together.
   3. Seal vapor barrier longitudinal seam overlap with vapor barrier adhesive.
   4. Wrap butt joints with four inch strip of vapor barrier jacket material cemented with vapor barrier adhesive.
   5. Finish with bands applied at mid-section and at each end of insulation.

B. Valves & Fittings:
   1. Insulate and finish by one of following methods:
      a. With hydraulic setting insulating cement, or equal, to thickness equal to adjoining pipe insulation.
      b. With segments of molded insulation securely wired in place.
      c. With prefabricated covers made from molded pipe insulation finished with vapor barrier adhesive.
      d. Zeston covers and factory applied insulation diapers.
   2. Finish fittings and valves with four ounce canvas and coat with vapor barrier adhesive or Zeston covers.

C. Piping located outdoors and exposed to the weather shall be insulated as indicated above except the thickness shall be determined according to the worst weather extremes expected. The insulation shall then be protected with one of the following weatherproof finishes as indicated on contract drawings:
   1. Metal jacketing shall be 0.016" (0.4 mm) minimum aluminum or stainless steel with moisture barrier, secured in accordance with the jacket manufacturer's recommendations. Joints shall be applied so they will shed water and shall be sealed completely.
   2. UV resistant PVC jacketing may be applied in lieu of metal jacketing provided jacketing manufacturer's limitations with regard to pipe size, surface temperature, and thermal expansion and contraction are followed.
   3. Fittings shall be insulated as prescribed above, jacketed with preformed fitting covers matching outer jacketing used on straight pipe sections, with all joints weather sealed.
   4. On outdoor chilled water and refrigerant lines, the insulation system shall be completely vapor sealed before the weather-resistant jacket is applied. The outer jacket shall not compromise the vapor barrier by penetration of fasteners, etc. Vapor stops at butt joints shall be applied at every fourth pipe section joint and at each fitting to provide isolation of water incursion.

END OF SECTION 230715

SECTION 230716 - DUCTWORK INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install insulation on air ducts outside building insulation envelope as described in Contract Documents.

B. Furnish and install insulation on fresh air ducts and combustion air ducts within building insulation envelope as described in Contract Documents.

C. Furnish and install insulation on other air ducts where indicated on Drawings.

PART 2 - PRODUCTS

2.1 INSULATION

A. 1-1/2 inch thick fiberglass with aluminum foil scrim kraft facing and have a density of one lb/cu ft.

B. Approved Manufacturers:
1. Manville Microlite FSK
2. CSG Type IV standard duct insulation
3. Owens-Corning FRK
4. Knauf (Duct Wrap FSK)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct wrap in accordance with Manufacturer's recommendations.

B. Do not compress insulation except in areas of structural interference.

C. Completely seal joints.

END OF SECTION 230716

SECTION 230717 – ROUND SUPPLY DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install round supply duct insulation as described in Contract Documents.

1.3 QUALITY ASSURANCE

A. Insulation shall be UL rated with FSK (foil-skrim-kraft) facing.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Fiberglass blanket insulation

B. Approved Manufacturers:
   1. Johns-Manville R-4 Microlite (R-4 does not include the vapor barrier material).
   2. Owens-Corning faced duct wrap insulation FRK-25 ED-150
   3. Certainteed Standard Duct Wrap.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Insulate round air supply ducts.

B. Facing shall overlap 2" at joints and shall be secured with outward clinch staples on 4" centers.

C. Ducts over 30" in width shall have spot application of adhesive, weld pins or metal screws and caps on not more than 18" centers applied to underside.

D. 3" wide vapor barrier paper shall be applied over seams and sealed with vapor barrier adhesive.

E. Insulate attenuators.

F. Insulate high and low pressure flex ducts.

END OF SECTION 230717

SECTION 230718 - DUCT LINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install acoustic lining in following above ground metal ductwork as described in Contract Documents unless detailed otherwise:
   1. Outside air
   2. Supply air
   3. Return air
   4. Mixed air
   5. Transfer air
   6. Relief air
   7. Elbows, fittings, and diffuser drops greater than 12 inches in length.

1.3 SYSTEM DESCRIPTION

A. Duct dimensions shown on Drawings are for free area inside insulation. Allowance must be made for insulation, where applicable.

1.4 **RATINGS**:

A. Material shall have maximum air friction correction factor of 1.10 at 1000 FPM velocity and have a minimum sound absorption coefficient NRC of .60.

PART 2 - PRODUCTS

2.1 DUCT LINER

A. One inch thick, 1-1/2 lb density fiberglass, factory edge coated.

B. Duct lining materials are to meet the requirements of UL 181 for mold, humidity, and erosion resistance.

C. Approved Manufacturers:
   1. Certainteed Ultralite 150 Certa Edge Coat
   2. Knauf - Type M
   3. Manville - Lina-Coustic
   4. Owen Corning Fiberglas - Aeroflex

2.2 ADHESIVE

A. Water Base Type:
   1. Cain - Hydrotak
   2. Duro Dyne - WSA
   3. Kingco - 10-568
   4. Miracle - PF-101
   5. Mon-Eco - 22-67
   6. Techno Adhesive - 133

B. Solvent Base (non-flammable) Type:
   1. Cain - Safetak
   2. Duro Dyne - FPG
   3. Kingco - 15-137
   4. Miracle - PF-91
   5. Mon-Eco - 22-24
   6. Techno Adhesive - 'Non-Flam' 106

C. Solvent Base (flammable) Type:
   1. Cain - HV200
   2. Duro Dyne - MPG
   3. Kingco - 15-146
   4. Miracle - PF-96
   5. Mon-Eco - 22-22
   6. Techno Adhesive - 'Flammable' 106

2.3 FASTENERS

A. Adhesively secured fasteners not allowed.

B. Approved Manufacturers:
   1. AGM Industries Inc - "DynaPoint" Series DD-9 pin
   2. Cain
   3. Duro Dyne
   4. Omark dished head "Insul-Pins"
   5. Grip nails may be used if each nail is installed by "Grip Nail Air Hammer" or by "Automatic Fastener Equipment" in accordance with Manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install mat finish surface on air stream side. Secure insulation to cleaned sheet metal duct with continuous 100% coat of adhesive and with 3/4 inch long mechanical fasteners 12 inches on center maximum unless detailed otherwise on Drawings. Pin all duct liner.

B. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.

C. In casings and plenums further contain insulation with wire mesh.

3.2 FIELD QUALITY CONTROL

A. If insulation is installed without longitudinal and end joints butted together, installation will be rejected and work removed and replaced with work that conforms to this Specification.

B. Insulation shall be installed in accordance with Duct Liner Application Standard SMACNA Manual 15.

3.3 ADJUSTING, CLEANING

A. Keep duct liner clean and free from dust. At completion of project, vacuum duct liner if it is dirty or dusty.

END OF SECTION 230718

SECTION 23 0722 – FIRE PROTECTION DUCT WRAP

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

4.2 SUMMARY

A. Furnish and install insulation on grease and air ducts requiring UL and NFPA fire protection within confines of building as described in Contract Documents.

B. Prio to installing insulation on grease ducts, ducts must be leak tested to 2.5 times operating static pressure and show 0.05% leakage for 15 minutes. Provide written report of compliance testing.

PART 5 - PRODUCTS

5.1 MATERIAL

A. Composition & Materials:
1. The PYROSCAT FP Duct Wrap system is composed of two layers of 1 ½" thick refractory grade fibrous fire barrier material designed to withstand temperatures in excess of 2000ºF. The PYROSCAT FP Duct Wrap comes in three forms, aluminum foil laminated on both sides (designated F2), aluminum foil laminated on one side (designated F1), and no foil lamination (designated F10). When the system is used in floor or wall penetrations, the PYROSCAT FP Duct Wrap is used in conjunction with Nelson FSP Fire Stop Putty.

B. Applicable Standards and Codes
1. PYROSCAT FP Duct Wrap meets the requirements of UL YYET for Grease Duct Enclosures in accordance with SBCCI Acceptance Criteria. This standard requires that the system meet the following:1)an external full scale fire test for 1 and/or 2 Hr Fire Resistance duct enclosures and through penetrations per UL 263/ASTM E-119 with hose stream; 2) minimum temperature rise standards in the 2000º Abnormal Temperature Test as detailed in "UL Subject 1978 Proposed First Edition of the Standard for Grease Ducts", 3) Surface Burning Characteristics per UL 723 (ASTM E-84 with FSI not over 25 and SDI not over 50. All testing for acceptance has been conducted at Underwriters Laboratories located in Northbrook, IL.
2. PYROSCAT FP Duct Wrap also meets all applicable requirements of NFPA 96 "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations".
3. Duct wrap shall be listed to AC-100/ASTM 2336 test standard for grease duct wrap. Also duct wrap shall comply with latest ICC Evaluation Services Report and 2003 International Mechanical Code.

5.2 MANUFACTURER

A. PYROSCAT FP Duct Wrap by Premier Refractories.

PART 6 - EXECUTION

6.1 INSTALLATION

A. Prior to use or concealment of any portion of the grease duct system, a leakage test shall be performed. This test will be required to be provided to the HVAC Inspector prior to concealment of the Grease Duct.

B. PYROSCAT FP Duct Wrap shall be applied by qualified contractors. The fire barrier material is supplied in roll form 24" x 300", or 48" x 180". Two layers are required to meet UL YYET for Grease Duct Enclosures and 2 Hr Fire Rated Air Duct Enclosures. Layers are overlapped a minimum of 3" and are secured using insulation pins, aluminum foil tape, and banding. See Guide to Installation of PYROSCAT FP Duct Wrap for Grease and Air Ducts.

END OF SECTION 23 0722

SECTION 230800 – FIRE STOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install fire stopping as described in Contract Documents.

1.3 QUALITY ASSURANCE

A. Fire stopping material shall meet ASTM E814, E84 and be UL listed.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Material shall be flexible, long lasting, intumescent acrylic seal to accommodate vibration and building movement.

B. Caulk simple penetrations with gaps of 1/4" or less with:
   1. Dow Corning Fire Stop Sealant
   2. Pensil 300

C. Caulk multiple penetrations and/or penetrations with gaps in excess of 1/4" with:
   1. Dow Corning Fire Stop Foam
   2. Pensil 200
   3. IPC flame safe FS-1900
   4. Tremco “Tremstop 1A”

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer's installation instructions explicitly.

B. Seal penetrations of ductwork, piping, and other mechanical equipment through one-hour and two-hour rated partitions as shown on Architectural and Mechanical Drawings.

C. Install fire stopping material on clean surfaces to assure adherence.

END OF SECTION 230800

SECTION 230900 – BUILDING AUTOMATION CONTROL SYSTEM

PART 1: GENERAL

1.0 SECTION INCLUDES

1. Scope of Work
2. Products Furnished But Not Installed Under This Section
3. Products Installed But Not Furnished Under This Section
4. Products Not Furnished Or Installed But Integrated With The Work Of This Section
5. Related Sections
6. Approved Control System Contractors and Manufacturers
7. Quality Assurance
8. Codes and Standards
9. Submittals
10. Warranty
11. Ownership of Proprietary Material

1.1 SCOPE OF WORK

A. The Building Automation System, (BAS) Contractor shall modify existing system and add require components for a fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring, and control as herein specified. The system shall include all required computer software and licenses, hardware, controllers, sensors, transmission equipment, system workstations, local panels, conduit, wire, installation, engineering database and setup, supervision, commissioning, acceptance test, training, warranty service, and at the owner's option extended warranty service. Licenses for all software shall be registered to the owner. The BAS system shall be an extension of the existing controls Automated Logic Building Automation system.

B. The BAS contractor shall match and be compatible with existing controllers to the current software revision to match the new controllers being installed.

C. The system shall only employ BACnet communications in an open architecture with the capabilities to support a multi-vendor environment. The system shall be capable of integrating third party system and utilizing the following standard protocols.

1. BACnet communication according to ASHRAE standard ANSI/ASHRAE 135-2001.
2. Modbus communication for integration to third party devices.

D. All materials and equipment used shall be standard components, regularly manufactured with standard part numbers, and owner's manuals for this and or other systems. One of a kind, third party, or custom integrations devices designed specifically for this project will not be allowed.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Control valves, flow switches, flow sensor thermo-wells and pressure taps to be installed under Division 22

1.3 APPROVED CONTROL SYSTEM CONTRACTORS AND MANUFACTURERS

1. System is an extension of the existing Automated Logic Controls BAS system as provided and installed by Clima-Tech, Inc. Mike Scott 208-283-4808.

1.4 QUALITY ASSURANCE

A. Contractor/Manufacturer Qualifications
   1. The system shall be furnished, engineered, and installed by the manufacturers' locally authorized representative. The controls contractor shall have factory-trained technician to provide instruction, routine maintenance, and emergency service within 24 hours upon receipt of a request
   2. All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Engineer in writing. Spare parts shall be available for at least 5 years after completion of this contract.

1.5 CODES AND STANDARDS

A. All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and

specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:

1. National Electric Code (NEC)
2. Uniform Building Code (UBC)
    a) Section 710.5, Wiring in Plenums
    b) Section 1106 Refrigeration Machinery Rooms
    c) Section 1107, Refrigeration Machinery Room Ventilation
    d) Section 1108, Refrigeration Machinery Room Equipment and Controls
    e) Section 1120, Detection and Alarm Systems
3. Uniform Mechanical Code (UMC)
4. ASHRAE 135-2001
5. FCC Regulation, Part 15- Governing Frequency Electromagnetic Interference
6. Underwriters Laboratories UL916

1.6 WARRANTY

A. Warrant all work as follows:
1. Labor and materials for the control system specified shall be warranted free from defects for a period of 12 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during normal business hours.
2. All work shall have a single warranty date, even when the Owner has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period
3. At the end of the final start-up, testing, and commissioning phase, if equipment and systems are operating satisfactorily to the Engineer, the Engineer shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this specification. The date of acceptance shall be the start of warranty.
4. Operator workstation software, project-specific software, graphic software, database software, and firmware updates which resolve known software deficiencies as identified by the Contractor shall be provided at no charge during the warranty period.

1.7 OWNERSHIP OF PROPRIETARY MATERIAL

A. All project-developed software and documentation shall become the property of the Owner. These include, but are not limited to:
1. Project graphic images
2. Record drawings
3. Project database
4. Project-specific application programming code
5. All documentation

PART 2: PRODUCTS

2.0 SECTION INCLUDES

1. Materials
2. Wiring and Raceways

2.1 MATERIALS

A. All products used in this project installation shall be new, currently under manufacture, and shall be applied in similar installations for a minimum of two years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner’s Representative in writing. Spare parts shall be available for at least five years after completion of this contract.

2.2 WIRING AND RACEWAYS

A. General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of Division 26.

B. All insulated wire to be copper conductors, UL labeled for 90C minimum service.

PART 3: EXECUTION

3.0 SECTION INCLUDES

1. Examination
2. Protection
3. Coordination
4. General Workmanship
5. Field Quality Control
6. Wiring
7. Communication Wiring
8. Identification of Hardware and Wiring
9. Controllers
10. Programming
11. Control System Checkout and Testing
12. Control System Demonstration and Acceptance
13. Cleaning
14. Training

3.1 EXAMINATION

A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started

B. The Contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started

C. The Contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate — or if any discrepancies occur between the plans and the Contractor's work, and the plans and the work of others — the Contractor shall report these discrepancies to the Engineer and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the Contractor to report such discrepancies shall be made by — and at the expense of — this Contractor.

3.2 PROTECTION

A. The Contractor shall protect all work and material from damage by its work or employees, and shall be liable for all damage thus caused

B. The Contractor shall be responsible for its work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects

3.3 COORDINATION

A. Site

1. Where the mechanical work will be installed in close proximity to, or will interfere with work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs its work before coordinating with other trades, so as to cause any interference with work of other trades, the Contractor shall make the necessary changes in its work to correct the condition without extra charge

2. Coordinate and schedule work with all other work in the same area, or with work which is dependent upon other work, to facilitate mutual progress.

B. Submittals. Refer to the "Submittals" Article in Part 1 of this specification for requirements

C. Test and Balance

1. The Contractor shall furnish all tools necessary to interface to the control system for test and balance purposes

2. The tools used during the test and balance process will be returned at the completion of the testing and balancing

D. Life Safety

1. Duct smoke detectors required for air handler shutdown are supplied and installed under Division 26.

2. Smoke dampers and actuators required for duct smoke isolation are provided under another Division 23 Section

3. Fire/smoke dampers and actuators required for fire rated walls are provided under another Division 23 Section. Control of these dampers shall be by Division 26.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the Contractor as follows:

1. All communication media and equipment shall be provided as specified in Part 2: "Communication" of this specification.

2. Each supplier of controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.

3. The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this Section and those provided under other sections or divisions of this specification.

3.4 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment

C. Install all equipment in readily accessible locations as defined by Chapter 1, Article 100, Part A of the National Electrical Code (NEC).

D. All wiring shall be verified for its integrity to ensure continuity and freedom from shorts and grounds

E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.5 FIELD QUALITY CONTROL

A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this specification

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship

C. Contractor shall have work inspected by local and/or state/provincial authorities having jurisdiction over the work

3.6 WIRING

A. All control and interlock wiring shall comply with national and local electrical codes and Division 26 of this specification. Where the requirements of this section differ with those in Division 26, the requirements of this section shall take precedence.

B. All NEC Class 1 (line voltage) wiring shall be UL Listed in approved raceway per NEC and Division 26 requirement.

C. All low-voltage wiring shall meet NEC Class 2 requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)

3.7 COMMUNICATION WIRING

A. The Contractor shall adhere to the items listed in the "Wiring" Article in Part 3 of the specification

B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling.

C. Do not install communication wiring in raceway and enclosures containing Class 1 or other Class 2 wiring

D. Maximum pulling, tension, and bend radius for cable installation as specified by the cable manufacturer shall not be exceeded during installation.

E. Contractor shall verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable.

F. All runs of communication wiring shall be unspliced length when that length is commercially available

3.8 IDENTIFICATION OF HARDWARE AND WIRING

A. Identify control panels with minimum 1 cm [½"] letters on laminated plastic nameplates.

B. Identify all other control components with permanent labels. All plug-in components shall be labeled such that removal of the component does not remove the label.

C. Identify room sensors relating to terminal box or valves with nameplates.

3.9 CONTROLLERS

A. Provide a separate controller for each AHU or other HVAC system.

B. Building Controllers and Advanced Application Controllers shall be selected to provide a minimum of 15% spare I/O point/object capacity for each point/object type found at each location. If input /objects are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required. A minimum of one spare is required for each type of point/object used.

1. Future use of spare capacity shall require providing the field device, field wiring, point/object database definition, and custom software. No additional controller boards or point/object modules shall be required to implement use of these spare points

3.10 PROGRAMMING

A. Provide sufficient internal memory for the specified sequences of operation and trend logging. There shall be a minimum of 25% of available memory free for future use.

B. Point/object Naming: System point/object names shall be modular in design, allowing easy operator interface without the use of a written point/object index.

C. Software Programming

1. Provide programming for the system and adhere to the sequences of operation provided. The Contractor also shall provide all other system programming necessary for the operation of the system, but not specified in this document. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation.

D. Operator Interface

1 Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point/object information on the graphic displays shall dynamically update. Show on each graphic all input and output points/objects for the system. Also show relevant calculated points/objects such as setpoints

2 Show terminal equipment information on a "graphic" summary table. Provide dynamic information for each point/object show

3 The Contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all Operator Workstation software and their functions as described in this section. This includes any operating

system software, the Operator Workstation database, and any third-party software installation and integration required for successful operation of the operator interface

3.11 CONTROL SYSTEM CHECKOUT AND TESTING

A. Start-up Testing: All testing listed in this article shall be performed by the Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner's Representative is notified of the system demonstration.

1. The Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification

2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight

3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures per manufacturers' recommendations

4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct

5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The Contractor shall check all control valves and automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to valve stem and damper blade travel

6. Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum Start/Stop routines.

7. Alarms and Interlocks

   a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm

   b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.

   c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.12 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Demonstration

1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed its own tests

2. The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process and as specified in the "Control System Checkout and Testing" Article in Part 3 of this specification. The Engineer will be present to observe and review these tests. The Engineer shall be notified at least 10 days in advance of the start of the testing procedures.

3. The demonstration process shall follow that approved in Part 1: "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration

4. The Contractor shall provide at least two persons equipped with two-way communication, and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point/object and system. Any test equipment required to prove the proper operation shall be provided by and operated by the Contractor.

5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.

6. Demonstrate compliance with Part 1: “System Performance

7. Demonstrate compliance with Sequences of Operation through all modes of operation

8. Demonstrate complete operation of Operator Workstation

B. Acceptance

1. All tests described in this specification shall have been performed to the satisfaction of both the Engineer and Owner prior to the acceptance of the control system as meeting the requirements of Completion. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Engineer. Such tests shall then be performed as part of the warranty.

2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1: “Submittals.”

3.13 CLEANING

1. The Contractor shall clean up all debris resulting from its activities daily. The Contractor shall remove all cartons, containers, crates, etc., under its control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

2. At the completion of work in any area, the Contractor shall clean all of its work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

3. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.14 TRAINING

A. General
1. Provide a minimum of two onsite training class 4 hours in length during the construction period for personnel designated by the owner.
2. Provide two additional training sessions at 6 and 12 months following building’s turnover. Each session shall be 4 hours in length and must be coordinated with the building Owner.

PART 4: SEQUENCE OF OPERATION

4.0 REFER TO DRAWINGS

END OF SECTION 230900

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. This Section includes piping, special-duty valves, makeup water for these systems; blowdown drain lines; and condensate drain piping.

1.3 DEFINITIONS

A. CPVC: Chlorinated polyvinyl chloride.

B. PVC: Polyvinyl chloride.

1.4 SUBMITTALS

A. Product Data: For each type of special-duty valve indicated. Include flow and pressure drop curves based on manufacturer's testing for diverting fittings, calibrated balancing valves, and automatic flow-control valves.

B. Shop Drawings: Detail fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, expansion joints and loops, and their attachment to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
1. Test procedures used.
2. Test results that comply with requirements.
3. Failed test results and corrective action taken to achieve requirements.

E. Maintenance Data: For hydronic specialties and special-duty valves to include in maintenance manuals specified in Division 23.

F. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

C. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.6 COORDINATION

A. Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate pipe sleeve installations for foundation wall penetrations.

C. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.

D. Coordinate pipe fitting pressure classes with products specified in related Sections.

E. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 3 Sections.

F. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies. Coordinate with requirements for firestopping specified in Division 7 Section "Through-Penetration Firestop Systems" for fire and smoke wall and floor assemblies.

1.7 EXTRA MATERIALS

A. Water Treatment Chemicals: Furnish sufficient chemicals for initial system startup and for preventive maintenance for one year from date of Substantial Completion.

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. Grooved Mechanical-Joint Fittings and Couplings:
   a. Central Sprinkler Company; Central Grooved Piping Products.
   b. Grinnell Mechanical Products.
   c. Victaulic Company of America.
2. Calibrated Balancing Valves:
   a. Armstrong Pumps, Inc.
   b. Flow Design, Inc.
   c. Gerand Engineering Company.
   d. Griswold Controls.
   e. ITT Bell & Gossett; ITT Fluid Technology Corp.
   f. Taco, Inc.
   g. Tour Andersson supplied by Victaulic
3. Pressure-Reducing Valves:
   a. Amtrol, Inc.
   b. Armstrong Pumps, Inc.
   c. Conbraco Industries, Inc.
   d. ITT Bell & Gossett; ITT Fluid Technology Corp.
   e. Spence Engineering Company, Inc.
   f. Watts Industries, Inc.; Watts Regulators.
4. Safety Valves:
   a. Amtrol, Inc.
   b. Armstrong Pumps, Inc.
   c. Conbraco Industries, Inc.
   d. ITT McDonnell & Miller Div.; ITT Fluid Technology Corp.
   e. Kunkle Valve Division.
   f. Spence Engineering Company, Inc.
5. Automatic Flow-Control Valves:
   a. Flow Design, Inc.
   b. Griswold Controls.
6. Expansion Tanks:
   a. Amtrol, Inc.
   b. Armstrong Pumps, Inc.
   c. ITT Bell & Gossett; ITT Fluid Technology Corp.
   d. Taco, Inc.
7. Air Separators and Air Purgers:
   a. Amtrol, Inc.
   b. Armstrong Pumps, Inc.
   c. ITT Bell & Gossett; ITT Fluid Technology Corp.
   d. Taco, Inc.

2.2 PIPING MATERIALS

A. General: Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.3 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

B. Annealed-Temper Copper Tubing: ASTM B 88, Type K.

C. DWV Copper Tubing: ASTM B 306, Type DWV.

D. Wrought-Copper Fittings: ASME B16.22.

E. Wrought-Copper Unions: ASME B16.22.

F. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.

G. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (silver).

2.4 STEEL PIPE AND FITTINGS

A. Steel Pipe, NPS 2 and Smaller: ASTM A 53, Type S (seamless) or Type F (furnace-butt welded), Grade B, Schedule 40, black steel, plain ends.

B. Steel Pipe, NPS 2-1/2 through NPS 12: ASTM A 53, Type E (electric-resistance welded), Grade B, Schedule 40, black steel, plain ends.

C. Steel Pipe, NPS 14 through NPS 18: ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 30, black steel, plain ends.

D. Steel Pipe, NPS 20: ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 20, black steel, plain ends.
   1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for NPS 2 and smaller and electric-resistance welded for NPS 2-1/2 and larger.

E. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250.

F. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.

G. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.

H. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced.

I. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

J. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   1. Material Group: 1.1.
   2. End Connections: Butt welding.
   3. Facings: Raised face.

K. Grooved Mechanical-Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47, Grade 32510 malleable iron; ASTM A 53, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings.

L. Grooved Mechanical-Joint Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
   1. **Standard Mechanical Couplings, 2 inch through 12 inch**: Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. (Gaskets used for potable water applications shall be UL classified in accordance with ANSI/NSF-61 for potable water service.) Mechanical Coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and ASTM A-183, minimum tensile strength 110,000 psi (758450 kPa).

a. **Rigid Type**: Coupling housings with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with ANSI B31.1, B31.9, and NFPA 13.
   1. 2 inch through 12 inch: Installation ready rigid coupling for direct stab installation without field disassembly. Gasket shall be Grade EPDM compound designed for operating temperatures from -30 deg F to +250 deg F. Gasket temperature rating shall be met without the use of special lubricants.

b. **Flexible Type**: Use in locations where vibration attenuation and stress relief are required. Flexible couplings may be used in lieu of flexible connectors at equipment connections. Three couplings, for each connector, shall be placed in close proximity to the vibration source.
   2. 2" through 8": Installation-ready flexible coupling for direct stab installation without field disassembly. Gasket shall be grade EPDM compound designed for operating temperatures from -30 deg F to +250 deg F. Gasket temperature rating shall be met without the use of special lubricants.
   3. 10" through 12": Standard flexible couplings. Gasket shall be Grade "E" EPDM compound designed for operating temperatures from -30 deg F to +230 deg F.

M. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150-psig minimum working pressure and 250 deg F maximum operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4-inch misalignment.

N. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body with steel flanges drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 250 deg F and pressures up to 150 psig.

O. Packed, Slip, Expansion Joints: 150-psig minimum working pressure, steel pipe fitting consisting of telescoping body and slip-pipe sections, packing ring, packing, limit rods, flanged ends, and chrome-plated finish on slip-pipe telescoping section.

P. Welding Materials: Comply with Section II, Part C, of the ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

Q. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

2.5 VALVES

A. Gate, globe, check, ball, and butterfly valves are specified in Division 23 Section "Valves."

B. Grooved-End Butterfly Valves
   1. 2" through 12" Sizes: 300 psi CWP suitable for bidirectional and dead-end service at full rated pressure. Body shall be grooved end black enamel coated ductile iron conforming to ASTM A536. Disc shall be electroless nickel plated ductile iron with blowout proof 416 stainless steel stem. Disc shall be offset from the stem centerline to allow full 360 degree circumferential seating. Seat shall be pressure responsive EPDM. Valve bearings shall be TFE lined fiberglass, and stem seals shall be of the same grade elastomer as the valve seat. Valve shall be complete with ISO flange for actuation mounting. Valve operators shall be lever handle or gear operator, available with memory stop feature, locking device, chainwheel, or supplied bare. (Valve with EPDM seat is UL classified in accordance with ANSI/NSF-61.)

C. Grooved-End Check Valves
   1. 2 inch through 12 inch sizes: Spring Assisted: Black enamel coated ductile iron body, ASTM A-536, Grade 65-45-12, elastomer encapsulated ductile iron disc suitable for intended service, stainless steel spring and shaft, welded-in nickel seat, 300 psi. Valve with pre-tapped ports as available option

D. Refer to Part 3 "Valve Applications" Article for applications of each valve.

E. Calibrated Balancing Valves, NPS 2 and Smaller: Bronze body, ball type, 125-psig working pressure, 250 deg F maximum operating temperature, and having threaded ends. Valves shall have calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set position.

F. Calibrated Balancing Valves, NPS 2-1/2 and Larger: Cast-iron or steel body, ball type, 125-psig working pressure, 250 deg F maximum operating temperature, and having flanged or grooved connections. Valves shall have calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set position.

G. Pressure-Reducing Valves: Diaphragm-operated, bronze or brass body with low inlet pressure check valve, inlet strainer removable without system shutdown, and noncorrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory set at operating pressure and have capability for field adjustment.

H. Safety Valves: Diaphragm-operated, bronze or brass body with brass and rubber, wetted, internal working parts; shall suit system pressure and heat capacity and shall comply with the ASME Boiler and Pressure Vessel Code, Section IV.

I. Automatic Flow-Control Valves: Gray-iron body, factory set to maintain constant flow with plus or minus 5 percent over system pressure fluctuations, and equipped with a readout kit including flow meter, probes, hoses, flow charts, and carrying case. Each valve shall have an identification tag attached by chain, and be factory marked with the zone identification, valve number, and flow rate. Valve shall be line size and one of the following designs:
1. Gray-iron or brass body, designed for 175 psig at 200 deg F with stainless-steel piston and spring.
2. Brass or ferrous-metal body, designed for 300 psig at 250 deg F with corrosion-resistant, tamperproof, self-cleaning, piston-spring assembly easily removable for inspection or replacement.
3. Combination assemblies, including bronze ball valve and brass alloy control valve, with stainless-steel piston and spring, fitted with pressure and temperature test valves, and designed for 300 psig at 250 deg F.

J. Plastic Ball Valves: 150-psig working pressure, 250 deg F maximum operating temperature, full port design, 1- or 2-piece body design, CPVC body and ball, polytetrafluoroethylene seats, EPDM seals, and tee handle; with threaded, socket, union, or flanged connections.

K. Plastic Butterfly Valves: 150-psig working pressure, 250 deg F maximum operating temperature, PVC wafer body, polytetrafluoroethylene seats, lever lock handle, and wafer style for installation between flanges.

2.6 HYDRONIC SPECIALTIES

A. Manual Air Vent: Bronze body and nonferrous internal parts; 150-psig working pressure; 225 deg F operating temperature; manually operated with screwdriver or thumbscrew; with NPS 1/8 discharge connection and NPS 1/2 inlet connection.

B. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150-psig working pressure; 240 deg F operating temperature; with NPS 1/4 discharge connection and NPS 1/2 inlet connection.

C. Expansion Tanks: Welded carbon steel, rated for 125-psig working pressure and 375 deg F maximum operating temperature, with taps in bottom of tank for tank fitting and taps in end of tank for gage glass. Tanks shall be factory tested with taps fabricated and labeled according to the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. Include the following fittings and accessories:
1. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug, and stainless-steel ball check, 100-gal. unit only; sized for compression-tank diameter. Design tank fittings for 125-psig working pressure and 250 deg F maximum operating temperature.
2. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig working pressure and 240 deg F maximum operating temperature; designed to admit air to compression tank, drain water, and close off system.
3. Gage Glass: Full height with dual manual shutoff valves, 3/4-inch- diameter gage glass, and slotted-metal glass guard.

D. Expansion Tanks: Welded carbon steel, rated for 125-psig working pressure and 375 deg F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity by a flexible bladder securely sealed into tank. Include drain fitting and taps for pressure gage and air-charging fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Factory fabricate and test tank with taps and supports installed and labeled according to the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

E. Tangential-Type Air Separators: Welded black steel; ASME constructed and labeled for 125-psig minimum working pressure and 375 deg F maximum operating temperature; perforated stainless-steel air collector tube designed to direct released air into expansion tank; tangential inlet and outlet connections; threaded connections for NPS 2 and smaller; flanged connections for NPS 2-1/2 and larger; threaded blowdown connection. Provide units in sizes for full-system flow capacity.

F. In-Line Air Separators: One-piece cast iron with an integral weir designed to decelerate system flow to maximize air separation at a working pressure up to 175 psig and liquid temperature up to 300 deg F.

G. Air Purgers: Cast-iron body with internal baffles that slow the water velocity to separate the air from solution and divert it to the vent for quick removal. Maximum working pressure of 150 psig and temperature of 250 deg F.

H. Bypass Chemical Feeder: Welded steel construction; 125-psig working pressure; 5-gal. capacity; with fill funnel and inlet, outlet, and drain valves.
1. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.

I. Diverting Fittings: 125-psig working pressure; 250 deg F maximum operating temperature; cast-iron body with threaded ends, or wrought copper with soldered ends. Indicate flow direction on fitting.

J. Y-Pattern Strainers: 125-psig working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for NPS 2-1/2 and larger, threaded connections for NPS 2 and smaller, bolted cover, perforated stainless-steel basket, and bottom drain connection.

Grooved Y-Pattern Strainer: 2 inch through 18 inch sizes, 300 PSI Y-Type Strainer shall consist of ductile iron body, ASTM A-536, Grade 65-45-12, Type 304 stainless steel perforated metal removable baskets with 1/16" (1,6mm) diameter perforations 2"-3" strainer sizes, 1/8" (3,2mm) diameter perforations 4"-12" strainer sizes, and 0.156" (4mm) diameter perforations 14" -18" strainer sizes. Strainer basket shall be accessed by removal of mechanical coupling.

K. Basket Strainers: 125-psig working pressure; high-tensile cast-iron body (ASTM A 126, Class B), flanged-end connections, bolted cover, perforated stainless-steel basket, and bottom drain connection.

L. T-Pattern Strainers: 750-psig working pressure; ductile-iron or malleable-iron body, grooved-end connections, stainless-steel basket with 57 percent free area; removable access coupling and end cap for strainer maintenance.

Grooved T-Pattern Strainer: 2" through 12" sizes, 300 PSI T-Type Strainer shall consist of ductile iron (ASTM A-536, Grade 65-45-12) body, Type 304 stainless steel frame and mesh removable basket with No. 12 mesh, 2"-3" strainer sizes, or No. 6 mesh, 4"-12" strainer sizes, 57% free open area. Strainer basket shall be accessed by removal of mechanical coupling.

M. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150-psig minimum working pressure and 250 deg F maximum operating temperature. Connectors shall have flanged- or threaded-end connections to match equipment connected and shall be capable of 3/4-inch misalignment.

N. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body with steel flanges drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 250 deg F and pressures up to 150 psig.

O. Packed, Slip, Expansion Joints: 150-psig minimum working pressure, steel pipe fitting consisting of telescoping body and slip-pipe sections, packing ring, packing, limit rods, flanged ends, and chrome-plated finish on slip-pipe telescoping section.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Heat Pump Water, NPS 2 and Smaller: Aboveground, use Type L drawn-temper copper tubing with soldered joints or Schedule 40 steel pipe with threaded joints. Belowground or within slabs, use Type K annealed-temper copper tubing with soldered joints. Use the fewest possible joints belowground and within floor slabs.

B. Heat Pump Water, NPS 2-1/2 and Larger: Schedule 40 steel pipe with welded and flanged joints.

C. Condensate Drain Lines: Type L drawn-temper copper tubing with soldered joints or Schedule 40, PVC pipe with solvent-welded joints.

3.2 VALVE APPLICATIONS

A. General-Duty Valve Applications: Unless otherwise indicated, use the following valve types:
1. Shutoff Duty: Gate, ball, and butterfly valves.
2. Throttling Duty: Globe, ball, and butterfly valves.

B. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of

equipment, unless only one piece of equipment is connected in the branch line. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.

C. Install calibrated balancing valves in the return water line of each heating or cooling element and elsewhere as required to facilitate system balancing.

D. Install check valves at each pump discharge and elsewhere as required to control flow direction.

E. Install safety valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Install safety-valve discharge piping, without valves, to floor. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements.

F. Install pressure-reducing valves on hot-water generators and elsewhere as required to regulate system pressure.

3.3 PIPING INSTALLATIONS

A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.

B. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

C. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

D. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

E. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

F. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.

G. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.

H. Anchor piping for proper direction of expansion and contraction.

3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 23 Section "Hangers and Supports." Comply with requirements below for maximum spacing of supports.

B. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer. cal runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for joint construction requirements for soldered and brazed joints in copper tubing; threaded, welded, and flanged joints in steel piping; and solvent-welded joints for PVC and CPVC piping.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents in mechanical equipment rooms only at high points of system piping, at heat-transfer coils, and elsewhere as required for system air venting.

C. Install dip-tube fittings in boiler outlet. Install piping to expansion tank with a 2 percent upward slope toward tank. Connect boiler-outlet piping.

D. Install in-line air separators in pump suction lines. Install piping to compression tank with a 2 percent upward slope toward tank. Install drain valve on units NPS 2 and larger.

E. Install combination air separator and strainer in pump suction lines. Install piping to compression tank with a 2 percent upward slope toward tank. Install blowdown piping with gate valve; extend to nearest drain.

F. Install bypass chemical feeders in each hydronic system where indicated, in upright position with top of funnel not more than 48 inches above floor. Install feeder in bypass line, off main, using globe valves on each side of feeder and in the main between bypass connections. Pipe drain, with ball valve, to nearest equipment drain.

G. Install expansion tanks above air separator. Install gage glass and cocks on end of tank. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.
   1. Support tank from floor or structure above with sufficient strength to carry weight of tank, piping connections, and fittings, plus weight of a full tank of water. Do not overload building components and structural members.

H. Install expansion tanks on floor. Vent and purge air from hydronic system, and ensure tank is properly charged with air to suit system design requirements.

3.7 TERMINAL EQUIPMENT CONNECTIONS

A. Size for supply and return piping connections shall be same as for equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If multiple, parallel control valves are installed, only one bypass is required.

D. Install ports for pressure and temperature gages at coil inlet connections.

3.8 CHEMICAL TREATMENT

A. Perform an analysis of supply water to determine the type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling, and to sustain the following water characteristics:

B. Fill system and perform initial chemical treatment.

3.9 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
   1. Leave joints, including welds, uninsulated and exposed for examination during test.
   2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
   3. Flush system with clean water. Clean strainers.
   4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
   5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
   6. Grooved pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing.
   7. The grooved couplings gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified.
   8. Grooved couplings installation shall be complete when visual metal-to-metal contact is reached.

3.10 GROOVED PIPING TRAINING

   1. A factory trained representative (direct employee) of the grooved coupling supplier shall provide on-site training for contractor’s field personnel in the use of grooving tools, application of groove, and product installation.

PART 4 - TESTING

A. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release trapped air. Use drains installed at low points for complete draining of liquid.
3. Check expansion tanks to determine that they are not air bound and that system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

4.2 ADJUSTING

A. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

B. Perform these adjustments before operating the system:
1. Open valves to fully open position. Close coil bypass valves.
2. Check pump for proper direction of rotation.
3. Set automatic fill valves for required system pressure.
4. Check air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Check operation of automatic bypass valves.
7. Check and set operating temperatures of boilers, chillers, and cooling towers to design requirements.
8. Lubricate motors and bearings.

4.3 CLEANING

A. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.

END OF SECTION 232113

SECTION 232115 – HOT WATER HEATING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install system of supply and return piping, boiler water make-up lines, and boiler drain lines as described in Contract Documents.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ends of all pipe shall be reamed out before being made up into fittings.

B. Use graphite and oil applied to male threads only in making up all pipe joint fittings.

C. Install unions on downstream side of shut-off valves and specialty valves and meters. Also install unions on both ends of radiation piping where piping goes from floor level into steel pipe troughs in floor slab.

D. Use teflon tape for lubricating threads on all threaded connections.

3.2 PIPING GRADE

A. Heating supply and return lines are to be graded up 1 inch to 40 feet, in the direction of flow with the high and low points in every case being in the boiler room to permit drainage.

B. Provide an automatic air eliminator at the high of each circuit and on the heating coils.

C. If it is necessary to change the grade of a flow main due to an obstruction, the high point shall be vented with an automatic air vent.

D. All runouts shall be taken off the top of the main and at least three elbow joints used on the spring piece to provide for expansion and contraction.

3.3 CLEANING SYSTEM

A. Thoroughly clean all equipment, piping and all other material controlled under this contract free from rust, scale, and other dirt before any painting or covering is done or the system is put into operation.

B. The heating system shall be thoroughly cleaned by operating at 10 psi for at least 6 hours.
   1. At end of run, the boiler is to be filled to the top with water and any film of oil or grease is to be washed over the top.
   2. Drain the boiler completely and refill to proper level with fresh water.
   3. Repeat this process three (3) times.
   4. Use 1 pound tri-sodium phosphate for every 100 gallons of water during cleaning operation.

3.4 FIELD QUALITY CONTROL

A. Piping systems shall be subjected to the following tests and no piping shall be covered or concealed until it has been so tested, inspected, and approved by the Architect and any local inspector having jurisdiction.
   1. Heating piping shall be hydrostatically tested at 50 psi in excess of maximum working pressures, 100 psi minimum.
   2. Without connecting equipment items rated below 100 psi, pressure test system at 100 psi for two hours. Correct leaks and defective work and repeat test until no leaks appear.

3. When so directed by Architect or Engineer, the Contractor shall conduct an operating test on any piece of equipment to demonstrate its capacity and/or operating characteristics.

END OF SECTION 232115

SECTION 232116 – HOT WATER HEATING SYSTEM SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install hot water heating specialties as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MANUAL AIR VALVES

A. On each coil or piece of equipment wherever an air pocket can form.

B. On each high point of piping or as shown on plans.

C. Approved Manufacturers:
1. Hoffman #500 or equal complete with #550 air chamber.

2.2 AUTOMATIC AIR ELIMINATORS

A. Furnish and install at the high point of each zone piping, or wherever an air pocket can form because of obstructions in the piping, a 3/4" float operated automatic air eliminator, Hoffman #79.

2.3 BALANCING FITTINGS

A. Automatic flow regulator kits complete with ball valve and strainer with capacity shown. Provide P/T test valves.
1. Approved Manufacturers:
   a. Griswold
   b. Auto flow

B. Manual balance valves with capacity shown. Provide with PT gage taps.
1. Approved Manufacturers:
   a. Bell & Gossett circuit setters
   b. Armstrong

2.4 PRESSURE GAUGES

A. Cases shall be black enameled cast aluminum with back flange for surface or line mounting.

B. Gauges shall be of the repairable type with sturdy brass movements and phosphor bronze tubes.

C. Range shall be selected so that normal operating pressure shall be approximately at the center of the dial.

D. 3-1/2 inch figure bourdon tube type pressure gauge.

E. Install on inlet of each pressure gauge a No. 38, 1/4 inch consolidated brass "T" handle gauge cock.

F. Approved Manufacturers:
1. U. S. Gauge
2. Trerice

2.5 THERMOMETERS AND ACCESSORIES

A. Red reading, mercury, separable socket, 7 inch cast, adjustable with 3 1/2 inch stem.

B. Range: Heating 30 degrees to 240 degrees F.

C. Provide other accessories as shown.

D. Approved Manufacturers:
1. Weiss
2. Trerice
3. Palmer

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install pressure gauges on each side of each pump and elsewhere as shown on plans.

B. Install "T" handle gauge cock on the inlet of each pressure gauge.

END OF SECTION 232116

SECTION 232125 - CLEANING AND FLUSHING WATER CIRCULATING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish labor and materials to thoroughly clean water circulating systems as described in Contract Documents.

B. Mechanical contractor shall procure the services of an independent treatment contractor as described in this specification.

1.3 QUALITY ASSURANCE

A. System Additives: This Contractor shall not add any water treatment chemicals or "stop-leak" compounds to the system.

PART 2 - EXECUTION

2.1 FIELD QUALITY ASSURANCE

A. Water circulating systems for project shall be thoroughly cleaned before placing in operation to rid system of dirt, piping compound, mill scale, oil, and other materials foreign to water being circulated.

B. During construction extreme care shall be exercised to prevent dirt and other foreign matter from entering pipe or other parts of system. Pipe stored on project shall have open ends capped and equipment shall have openings fully protected. Before erection, each piece of pipe, fittings, or valve shall be visually examined and dirt removed.

C. Side Stream Filtration and Flushing Valves
1. The Mechanical Contractor shall install a bag style side stream filter in the main mechanical room. This filter shall be furnished with 12 clean polyester bags with a filtration rating of 5 micron. The filter shall be sized to provide a pressure drop equal to the pressure drop of the parallel component with 80% flow through the primary component and 20% through the filter. Minimum filter size shall be 18” high and 6” in diameter. If this minimum size allows excessive flow through the side stream filter a balance valve shall be installed to insure sufficient flow through the primary central plant component.
2. Ball valves of full line size shall be installed at the end of each primary run. The valves shall have a nipple and cap installed.

D. Hydronic Pump Closed Loop Cleaning
1. Prior to any introduction of fluids to the closed loop system the Mechanical Contractor shall close isolation valves at each heat pump and open the bypass valve to prevent flow through the strainer, flow control device and heat pump during the initial flushing and subsequent cleaning. The side stream filter bag shall be removed during the initial flushing process.
2. The Mechanical Contractor shall fill each hydronic system with clean fresh water prior to cleaning and thoroughly leak check system piping. A cleaning and passivating agent supplied by the Chemical Treatment Contractor shall be added to the system at the direction of the Treatment Contractor during the leak check process to minimize initial corrosion. If the system is filled multiple times during the leak check and repair process the Mechanical Contractor shall coordinate with the Treatment Contractor to maintain this initial protection. The Treatment Contractor is responsible for providing chemical for up to two refills of the system. If additional chemical is required due to multiple refillings the Mechanical Contractor shall be responsible for the additional time and chemical.
3. Following leak check the closed system shall be flushed by the Mechanical Contractor until the leaving water runs clear. All primary runs shall be flushed at their ends to obtain maximum sweep of debris from the system. The inlet screens on the circulating pumps must be kept clear during this initial cleaning process and inspected following cleaning. When flushing is complete the system is to be left full.
4. Prior to flushing the Mechanical Contractor shall coordinate with Treatment Contractor so that the Treatment Contractor can be available immediately following flush and final refill to add cleaning chemical within 4 hours to prevent initial corrosion.

5. Following initial flushing the Chemical Treatment Contractor shall refill all systems with cleaning and passivating agents raising the PH to a minimum of 10, circulate and flush until thoroughly clean. All primary piping runs shall be flushed at the ends during this cleaning process. When boiler operation is available the loop temperature should be raised to 110 to 120° to accelerate cleaning. Cleaning with availability of boiler operation should be anticipated to last 7 to 10 days or longer depending on initial loop conditions. If boiler operation is unavailable loop cleaning duration should be expected to double. The Chemical Treatment Contractor shall verify and adjust cleaning chemistry, and inspect side stream filter bags at a minimum of every two days, exception for weekends. Filter bags shall be changed as required during this cleaning process. Cleaning shall continue until these bags no longer show signs of debris.
6. Following cleaning process the Treatment Contractor shall close the bypass valves at each heat pump and open isolation valves for normal operation and check for leaks of local piping connections. Any leaks found shall be referred to the Mechanical Contractor for repair. The bypass valve handle shall be removed and tied to the valve. The system shall then be charged with final operating chemical to control long term corrosion and a clean bag filter shall be installed in the system.
7. The Treatment Contractor shall provide final inspection report for inclusion in the Operation and Maintenance Manual. Additionally the Treatment Contractor shall take loop samples approximately 12 months following completion, add or adjust chemical as required and provide a post construction report to the owner prior to warranty closeout. Chemical required is the responsibility of the Treatment Contractor.

E. Fluid Cooler Chemical Treatment Station
1. A chemical treatment station shall be provided by the Treatment Contractor in a 24” x 24” locked cabinet. Station shall include LMI DC4000-1-1 conductivity meter with sensor and A-17-1-1351S chemical pump, or approved equal. The chemical station shall be located inside the mechanical room. Mechanical Contractor shall provide ¾” PVC piping from the discharge of the spray pump of the fluid cooler to the station enclosure with T’s for installation of the conductivity sensor and for chemical injection. This contractor shall also provide return piping back to the fluid cooler sump at the opposite end from the spray pump pickup. The Treatment Contractor shall install the conductivity sensor and injection fitting in the T’s provided and set up initial treatment.
2. Under the scope of this specification the Treatment Contractor shall monitor the tower sump and adjust feed and bleed to maintain proper control of scale and corrosion for a period of one year. At a minimum tower treatment shall be check monthly from May until October. The Treatment Contractor shall provide all chemical required during the first year of operation

END OF SECTION 232125

SECTION 233114 - LOW-PRESSURE STEEL DUCTWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install above-grade ductwork and related items as described in Contract Documents.

PART 2 - PRODUCTS

2.1 DUCTS

A. Fabricate of zinc-coated lockforming quality steel sheets meeting requirements of ASTM 653A/653M, "Specification for Sheet Steel Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock Forming Quality", with G 60 coating.

B. Use of aluminum, non-metallic, or round ducts is not permitted. [Specification writer: Use of aluminum ducts in areas with high chlorine content (eg.: ventilation for pools, spas, etc.) should be considered on a per job basis.]

2.2 DUCT JOINTS

A. Ducts with sides up to and including 36 inches shall be as detailed in the SMACNA manual.

B. Duct sizes over 36 inches shall be fabricated using SMACNA T-24 flange joints or pre-fabricated systems as follows:
   1. Ducts with sides over 36 inches to 48 inches:
      a. transverse duct joint system by Ductmate/25, Nexus, Ward, or WDCI (Lite) (SMACNA "E" or "G" Type connection).
   2. Ducts 48 inches & larger:
      a. Ductmate/35, Nexus, or WDCI (Heavy) (SMACNA "J" Type connection).
   3. Approved Manufacturers:
      a. Ductmate Industries Inc, 10760 Bay Meadows Drive, Sandy, UT 84092 (801) 571-5308
      b. Nexus, Exanno Corp, P O Box 729, Buffalo, NY 14206 (716) 849-0545
      c. Ward Industries Inc, 1661 Lebanon Church Road, Pittsburg, PA 15236 (800) 466-9374
      d. WDCI, P O Box 10868, Pittsburg, PA 15236 (800) 245-3188

2.3 ACCESS DOORS IN DUCTS

A. At each manual outside air damper and at each motorized damper, install factory built insulated access door with hinges and sash locks. Locate doors within 6 inches of installed dampers. Construction shall be galvanized sheet metal, 24 ga minimum.

B. Fire and smoke damper access doors shall have a minimum clear opening of 12" x 12" or as specified on Drawings to easily service fire or smoke damper. Doors shall be within 6 inches of fire and smoke dampers and in Mechanical Room if possible.

C. Identify each door with 1/2" high letters reading “smoke damper” or “fire damper”.

D. Approved Manufacturers:
   1. AirBalance - Fire/Seal #FSA 100
   2. Air Control Products - HAD-10
   3. Cesco-Advanced Air - HAD-10
   4. Elgen - Model 85 A
   5. Kees Inc - ADH-D.
   6. Louvers & Dampers - #SMD-G-F
   7. Nailor-Hart Industries Inc - Series 0831
   8. National Controlled Air Inc - Model AD-FL-1

2.4 FLEXIBLE EQUIPMENT CONNECTIONS

A. 30 oz closely woven UL approved glass fabric, double coated with neoprene.

B. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 250 deg F.

C. Approved Manufacturers:
1. Cain - N-100
2. Duro Dyne - MFN
3. Elgen - ZLN
4. Ventfabrics - Ventglas

2.5 CONCEALED CEILING DAMPER REGULATORS

A. Approved Manufacturers:
1. Cain
2. Duro Dyne
3. Metco Inc
4. Vent-Lock - #666
5. Young - #303

2.6 VOLUME DAMPERS

A. In Main Ducts:
1. 16 gauge galvanized steel, opposed blade type with 3/8 inch pins and end bearings. Blades shall have 1/8 inch clearance all around.
2. Damper shall operate within acoustical duct liner.
3. Provide channel spacer equal to thickness of duct liner.
4. Approved Manufacturers:
   a. Air Balance - Model AC-2
   b. Air Control Products - CD-OB
   c. American Warming - VC-2-AA
   d. Greenheck - VCD-1100
   e. NCA, Safe Air
   f. Vent Products - 5100

B. In Sheet Metal Branch Ducts:
1. Extruded aluminum, opposed blade type. When in open position, shall not extend beyond damper frame.
2. Maximum blade length 12 inches.
3. Damper Regulator shall be concealed type with operation from bottom or with 90 deg miter gear assembly from side.
4. Approved Manufacturers:
   a. Air Control Products - TCD-OB
   b. Air Guide - OB
   c. Arrow - OBDAF-207
   d. CESCO - CDA
   e. Reliable Metals - OBD-RO
   f. Tuttle & Bailey - A7RDDM
   g. Safe Air
   h. Young - 820-AC

C. Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, provide concealed ceiling damper regulator and cover plate.

2.7 MOTORIZED OUTSIDE AIR DAMPERS

A. Damper Blades:
1. 18 gauge galvanized steel or equivalent aluminum with replaceable rubber blade edges, 9 inches wide maximum.
2. End seals shall be flexible metal compression type.
3. Opposed blade type.

B. Make provision for damper actuators and actuator linkages to be mounted external of air flow.

C. Approved Manufacturers & Models:
1. Air Balance - AC-2
2. American Warming - VC-2-AAVA
3. Arrow - OBDAF-207
4. Greenheck - VCD-2100
5. Honeywell - D641
6. Johnson - D1300
7. Louvers & Dampers - TSD400
8. Ruskin - CD36 or CD60
9. Safe Air - 610
10. Vent Products - 5800

2.8 BACKDRAFT DAMPER

A. Backdraft blades shall be nonmetallic and shall be neoprene coated fiberglass.

B. Stop shall be galvanized steel screen or expanded metal, 1/2 inch mesh.

C. Frame shall be galvanized steel or extruded aluminum alloy.

D. Approved Models & Manufacturers:
1. Air Control Products - FBD
2. American Warming - BD-15
3. CESCO - FBD 101
4. Ruskin - NMS2
5. Safe Air

2.9 DUCT HANGERS

A. 1" x 18 gauge galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 8 feet apart. Do not use wire hangers.

B. Attaching screws at trusses shall be 1-1/2 inch No. 10 round head wood screws. Nails not allowed.

2.10 DUCT SEALER

A. Cain - Duct Butter or Butter Tak

B. Design Polymerics - DP 1010

C. DSC - Stretch Coat

D. Duro Dyne - S2

E. Hardcast - #601 Iron-Grip or Peel-N-Seal Tape
1. Kingco - 15-325
2. Mon-Eco - 44-41
3. Trans-Continental Equipment Co - Multipurpose Duct Sealant
4. United - Sheet Metal duct-sealer

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ducts:
1. Straight and smooth on inside with joints neatly finished unless otherwise directed.
2. Duct panels through 48 inch dimension having acoustic duct liner need not be crossbroken or beaded.
3. Crossbreak unlined ducts and duct panels larger than 48 inch or bead 12 inches on center.
4. Securely anchor ducts to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger.
5. Brace and install ducts so they shall be free of vibration under all conditions of operation.
6. Ducts shall not bear on top of structural members.
7. Make duct take-offs to branches, registers, grilles, and diffusers as detailed on Drawings.

8. Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.
9. Properly flash where ducts protrude above roof.
10. Install internal ends of slip joints in direction of flow. Make joints air tight using specified duct sealer.
11. Cover horizontal and longitudinal joints on exterior ducts with two layers of Hardcast tape installed with Hardcast HC-20 adhesive according to Manufacturer's recommendations.
12. Paint ductwork visible through registers, grilles, and diffusers flat black.

B. Install flexible inlet and outlet duct connections to each furnace, fan, fan coil unit, and air handling unit.

C. Install concealed ceiling damper regulators.
1. Paint cover plates to match ceiling tile.
2. Damper regulators will not be required for dampers located directly above removable ceilings or in Mechanical Rooms.

D. Provide each take-off with an adjustable volume damper to balance that branch.
1. Anchor dampers securely to duct.
2. Install dampers in main ducts within insulation.
3. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
4. Where concealed ceiling damper regulators are installed, provide a cover plate.

E. Install grilles, registers, and diffusers. Level floor registers and anchor securely into floor.

F. Air Turns:
1. Permanently installed, consisting of single thickness curved metal blades with one inch straight trailing edge to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
2. 4-1/2 inch wide minimum vane rail. Do not use junior vane rails.
3. Double thickness vanes not acceptable.
4. Quiet and free from vibration when system is in operation. See SMACNA Manual

G. Install motorized dampers

END OF SECTION 233114

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 15055 apply to this Section.

4.2 SUMMARY

A. Furnish and install fan powered volume boxes as described in Contract Documents.

4.3 QUALITY ASSURANCE

A. Fan boxes shall be tested and certified by the Air Diffusion Council.

PART 5 - PRODUCTS

5.1 MANUFACTURED UNITS

A. Fan induction boxes consisting of primary air damper, radiated noise shroud, primary air controllers, centrifugal fan, and attached heating coil.

B. Fan motor shall be variable speed, with speed controller, and permanent split capacitor motors with thermal overload protection.

C. Variable volume part of unit shall modulate between 100% and 0% capacity to supply cooling to space.

D. Box is controlled by a wall mounted thermostat. Thermostat operates an actuator and PE switch on unit, plus additional PE switches or valves on the stages of heat.
   1. On a signal from the thermostat for the unit to go to full cooling, the damper is controlling on maximum air volume, the fan is off and the heat source is off.
   2. A fall in space temperature will cause the damper to modulate closed. Before the VAV damper has fully closed, temperature of the space energizes the PE switch and starts the fan. A still further fall in space temperature brings on the heating coil.

E. Box Casing Fabrication:
   1. Heavy gauge (min.22 ga.) zinc-coated sheet steel
   2. Lined with 1" thick glass fiber insulation which conforms to NFPA-90A. Insulation shall be coated to prevent erosion.
   3. Access doors shall be provided, on bottom of box, large enough to permit removal of fan.

F. Fan Assemblies:
   1. Internally suspended on rubber isolators.
   2. Box fan operates whenever cooling or heating is required.
   3. Controls shall be located behind a removable metal enclosure on side of box.

G. Controls shall be pneumatic or electronic as specified in control section of these specifications and shall be enclosed by a zinc-coated sheet steel cover.
   1. Primary air volume controller shall be pressure independent and shall control air volume within plus or minus 5% of design air volume regardless of change in system static pressure. Primary air controller shall reset the air volume, as required by thermostat with same accuracy.
   2. Reset primary air volume shall not be affected by changes in the system static pressure.
   3. Boxes using cfm limiters are not acceptable.
   4. Each box shall be factory set for maximum (and minimum) cfm.

H. CFM sensing tubes shall be the type that produces a controlled velocity within sensor, more commonly called a "spider sensor."
   1. The same sensing tubes shall also be used as balancing taps for field adjustment of primary cfm.

2. The balancing taps shall be used in conjunction with a flow chart on each box to permit re-adjustment of primary air volume if job conditions so dictate.
3. Field re-adjustment shall be by means of adjustment screws.
4. Refer to the performance data for proper fan speed, downstream resistance and resultant cfm whenever re-adjusting primary air volume.

I. Approved Manufacturers:
1. Match existing make and model.
2. Tempmaster
3. Enviro-Tec

END OF SECTION 23 3115

SECTION 233116 – VARIABLE AIR VOLUME BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Variable volume terminal units.

B. Integral sound attenuator.

C. Integral heating coils.

D. Integral damper motor operators.

1.2 RELATED REQUIREMENTS

A. Section 23 0501 - Common HVAC Requirements.

B. Section 23 0900 – Building Automation Control System.

C. Section 23 2113 - Hydronic Piping.

D. Section 23 2116 - Hydronic Specialties: Connections to heating coils.

E. Section 23 3114 – Low Pressure Steel Ductwork.

F. Section 23 3713 - Air Outlets and Inlets.

1.3 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association; 2009.

B. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 3300 – for submittal procedures.

B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.

1. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 to 4 inch wg (250 to 1000 Pa).

D. Manufacturer's Installation Instructions: Indicate support and hanging details, and service clearances required.

E. Project Record Documents: Record actual locations of units.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant volume regulators.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 WARRANTY

A. See Section 01 7700 - Closeout Procedures, for additional warranty requirements.

B. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Price: www.price-hvac.com

B. Trane: www.trane.com

C. Titus: www.titus-hvac.com.

D. Match existing make and model.

2.2 MANUFACTURED UNITS

A. Ceiling mounted variable air volume supply air control terminals for connection to single duct, central air systems, with electric variable volume controls, and hot water heating coils.

B. Identify each terminal unit with clearly marked identification label and air flow indicator. Include unit nominal air flow, maximum factory set airflow, minimum factory set air flow, and coil type.

2.3 SINGLE DUCT VARIABLE VOLUME UNITS

A. Basic Assembly:
   1. Casings: Minimum 22 gage (0.8 mm) galvanized steel.
   2. Lining: Minimum 1/2 inch (13 mm) thick neoprene or vinyl coated fibrous glass insulation, 1.5 lb/cu ft (24 g/L) density, meeting NFPA 90A requirements and UL 181 erosion requirements. Face lining with mylar film.
   3. Plenum Air Inlets: Round stub connections for duct attachment.
   4. Plenum Air Outlets: S slip and drive connections.

B. Basic Unit:
   1. Configuration: Air volume damper assembly inside unit casing. Locate control components inside protective metal shroud.
   2. Volume Damper: Construct of galvanized steel with peripheral gasket and self lubricating bearings; maximum damper leakage: 2 percent of design air flow at 1 inches (0.25 kPa) rated inlet static pressure.
   3. Mount damper operator to position damper normally open.

C. Attenuator Section: Line attenuator sections with 2 inch (50 mm) thick insulation.

D. Pick-up sensor.

E. Hot Water Heating Coil:
   1. Construction: 1/2 inch copper tube mechanically expanded into aluminum plate fins, leak tested under water to 200 psig pressure, factory installed.
   2. Capacity: As scheduled.

F. Automatic Damper Operator:
   1. Electric Actuator: 24 volt with high limit. Refer to Section 23 0900.

G. Thermostat: Wall-mounted DCC type with appropriate mounting hardware. Refer to Section 23 0900.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide and install ceiling access doors or locate units above easily removable ceiling components.

C. Support units individually from structure. Do not support from adjacent ductwork.

D. Connect to ductwork in accordance with Section 23 3100.

E. Provide lined ductwork downstream of units.

F. Verify that electric power is available and of the correct characteristics.

3.2 ADJUSTING

A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to 0 percent full flow. Set units with heating coils for minimum 50 percent full flow.

END OF SECTION 233116

SECTION 233182 – HIGH PRESSURE DUCT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install high pressure duct systems as described in Contract Documents.

PART 2 - PRODUCTS

2.1 ROUND AND OVAL

A. Ducts so designated and supplying air to VAV boxes shall be of spiral lockseam conduit. The conduit shall be fabricated from high quality, bright spangled, open-hearth, galvanized steel and shall be formed with a reinforcing rib on the outside filled with sealant and smooth interior. All duct and fittings shall be for 6 inch WG static pressure.

B. Fittings shall be fabricated from galvanized sheets with longitudinal and0 transverse seams welded and coated inside and out with rust inhibiting paint. Branch take-off from tees and laterals shall be welded to the trunk body by means of everdure welding. The fittings shall be formed with a roll shoulder against which the pipe shall be butted in installation.

C. Pipe and fittings shall be joined using adhesive recommended by the duct manufacturer painted on the male and female end of the pipe and fittings, pushed into place, fastened with No. 7x3/4 sheet metal screws, wrapped with three layers of fiberglass tape, 2 inches wide.

D. Flat-oval ducts shall be installed where shown with fittings of like type and shall be reinforced on the outside with angle iron as detailed and as recommended by the duct manufacturer if the width exceeds twice the height.

E. Vertical duct risers shall be supported at each floor by angle iron welded to ducts and connected to building structure at each floor.

F. High pressure duct and fittings shall be manufactured by same manufacturer and shall have guaranteed pressure ratings.

G. Approved Manufacturers:
1. Team Mechanical
2. United Sheet Metal
3. Lewis Corp.

H. Duct Sealant - SMACNA duct sealant class "A".

2.2 HIGH PRESSURE FLEXIBLE DUCT

A. High pressure flexible duct used upstream of terminal boxes shall be rated UL-181 Class 1 air duct and approved by NFPA 90A and 90B.

B. Thermal conductance: C=.23.

C. Rated for working pressure of 15 inches WG and with a velocity of up to 6,000 FPM.

D. Temperature range rated to 250 deg. F.

E. Core fabric shall be glass fiber reinforced copolymer impregnated through fire retardant fabric with low smoke and flame ratings.

F. Interior:
1. Smooth with no seams for laminar air flow

2. Low pressure drop
3. No dust collecting crevices
4. Leakproof

G. Insulation shall be 1" x 1# density glass fiber.
1. Vapor barrier shall be scuff resistant and be cuffed at both ends for overlap.
2. Joints and connections shall be made with two 1/2" wide positive locking steel or plastic straps. One strap shall attach the inner liner and a second strap shall strap the vapor barrier and insulation so they cover 1" past the inner liner.
3. Duct tape will not be used.
4. Approved Manufacturers:

H. Genflex IMPR

2.3 ACOUSTICAL LINED HIGH PRESSURE DUCT

A. 1 inch acoustical duct insulation between outer duct wall and an inner perforated metal liner.

B. Construction shall give specified acoustic impedance for noise reduction and have mechanical means to maintain positive concentricity of liner with shell and protect against any fiber entrainment.

C. Insulation shall have a thermal conductivity of 0.27.

D. Approved Manufacturers:
1. United Sheet Metal "Acousti-K27"
2. or approved equal

PART 3 - EXECUTION

3.1 TESTING

A. High pressure duct system shall be tested in sections after installation.
1. Test shall consist of placing each sealed section under a pressure of 8 inches WG. Air lost by leakage shall not exceed 1/2% of the total air quantity.
2. If above test indicates duct leaks beyond conditions specified, joints in ducts shall be treated with soap solution and leaks repaired until above specified conditions are obtained.
3. Tests shall be conducted in presence of Engineer.

B. Large vertical risers and ducts in fan room shall be tested with system in operation using soap solution to detect leaks. Leaks indicated by actively blowing bubbles shall be repaired.

C. Actual method used shall be as recommended by duct manufacturer.

END OF SECTION 233182

SECTION 23 3316 - FIRE DAMPERS

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

4.2 SUMMARY

A. Furnish and install fire dampers at penetrations of fire rated walls, floors, & ceilings, at ducts, registers, grilles, or louvers as described in Contract Documents.

4.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Dampers shall conform to UL and NFPA requirements and bear UL label.
   2. Dampers shall be approved by State Fire Authorities where so required.

4.4 MAINTENANCE MATERIALS

A. Leave six fusible links of each rating type used on Project with Owner.

PART 5 - PRODUCTS

5.1 FIRE DAMPERS

A. Walls & Floors:
   1. Type "B" with 165 deg F link unless otherwise indicated on Drawings.

B. Ceilings:
   1. Radiation type ceiling fire damper with 165 deg F link unless otherwise indicated on Drawings.

C. Approved Manufacturers:
   1. Air Balance Inc
   2. Cesco
   3. Safe Air Inc
   4. Ultra Safe

PART 6 - EXECUTION

6.1 INSTALLATION

A. Fire damper installation shall conform to details shown in SMACNA Fire Damper Guide and as required by manufacturer’s recommendations and local codes.

B. Each fire damper shall have access panel for maintenance and inspection.

C. Locate access panels not more than 6 inches from fire damper they serve.

END OF SECTION 23 3316

SECTION 233346 - FLEX DUCT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install supply air branch duct runouts to diffusers as described in Contract Documents.

PART 2 - PRODUCTS

2.1 DUCTS

A. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict air flow after bending.

B. Nominal 1-1/2 inches thick, 3/4 lb/cu ft density fiberglass insulation with air-tight, polyehtylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.

C. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.

D. Length of flexible ductwork shall not exceed 8'-0".

2.2 APPROVED MANUFACTURERS

A. ANCO-FLEX - 4625

B. Flex-Aire - PF/UPC #090

C. Hart & Cooley - F114

D. Thermaflex - G-KM

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct in fully extended condition free of sags and kinks.

B. Make duct connections by coating exterior of duct collar for 3 inches with duct sealer and securing duct in place over sheet metal collar with 1/2 inch wide metal cinch bands and sheet metal screws.

END OF SECTION 233346

SECTION 23 3400 - EXHAUST FANS

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

4.2 SUMMARY

A. Furnish and install exhaust fans as described in Contract Documents.

4.3 QUALITY ASSURANCES

A. Requirements of Regulatory Agencies:
   1. Bear AMCA seal and UL label.

PART 5 - PRODUCTS

5.1 CEILING MOUNTED EXHAUST FANS

A. Acoustically insulated housings.

B. Sound level rating of 4.6 sones maximum for fan RPM and CFM listed on Drawings.

C. Include chatterproof integral back-draft damper with no metal to metal contact.

D. True centrifugal wheels.

E. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.

F. Suitably ground motors and mount on rubber-in shear vibration isolators.

G. Provide wall or roof cap, as required.

H. Approved Manufacturers:
   1. Cook-Gemini
   2. Greenheck Sp
   3. Pace
   4. Penn Zephyr
   5. Twin City

5.2 ROOF MOUNTED EXHAUST FANS

A. Direct drive or have adjustable pitch V-belt as noted on Drawings.

B. Wheels shall be backward curved and housing shall be removable or hinged aluminum.

C. Isolate motor with vibration dampeners.

D. Provide quiet type back-draft dampers.

E. Insulated, pre-fabricated metal roof curb shall be for flat or sloped roof as shown on Drawings.

F. Approved Manufacturers:
   1. Fans:
      a. Penn
      b. Centri-Master
      c. Cook
      d. Greenheck G, GB
      e. Twin City

2. Standard curbs:
    a. Penn
    b. Cook
    c. Greenheck
3. Sound attenuating curbs:
    a. Penn
    b. Greenheck

5.3 UTILITY BLOWERS

A. Forward curve belt drive.

B. Blowers shall be completely factory assembled and tested as a unit with electric motor, adjustable motor base, adjustable V-belt drive beyond bearings and drive cover.

C. Housing shall be heavy gauge steel completely arc-welded for airtight construction. Housings shall be convertible to any one of 8 positions in 45 1/2 increments.

D. Inlet shall be unobstructed with streamlined contour.

E. Blower shall bear the AMCA certified rating seal.

F. Blower sizes and capacities shall be as listed on the drawings.

G. Provide spring isolator sizes for unit weight and frequency.

H. Fans for kitchen exhaust service shall have sparkproof wheels and cleanout doors.

I. Approved Manufacturers:
1. Peerless
2. Barry
3. Twin City
4. Cook

5.4 CENTRIFUGAL IN-LINE FANS

A. Non-overloading design and of arrangement indicated.

B. Constructed of low carbon steel and painted with an approved rust resistant coating or all aluminum as shown.

C. Fan performance shall be based on tests conducted in accordance with the AMCA Standard test code of air moving devices and shall be licensed to bear the AMCA Certified Air and Sound Rating Seal. Fans shall have a sharply rising pressure characteristic extending through the operating range and continuing to rise well beyond the efficiency peak to assure quiet and stable operation under all conditions. Horsepower characteristics shall be truly self-limiting and shall reach a peak in the normal selection area.

D. Wheel diameters shall be in accordance with the standard sizes adopted by AMCA for centrifugal in-line type fans. Inlets shall be fully streamlined and housings shall be suitably braced to prevent vibration or pulsation. Housings shall be arc welded steel throughout.

E. Fan wheel shall include die formed AIRFOIL blades designed for maximum efficiency and quiet operation. Blades shall be continuously welded to back plate and welded to wheel cone. Class 2 fan with inlet and outlet bell fittings.

F. Wheels shall be statically and dynamically balanced and assembled fan shall be tested for balance at specified speed at the factory prior to shipment. Such tests shall be performed with an IRD analyzer to measure radial and axial displacements.

G. Bearings are to be ball or roller anti-friction type, and shall be equipped with extended lubrication lines to grease fittings outside of the fan housing. Shafts shall operate at no more than 70% of first critical speed to assure smooth operation.

H. Accessories for in-line fans to include belt guard, inlet and outlet flanges, and other accessories as called for in the plans.

I. All fans shall be equipped with an adjustable motor base integral with the fan housing. This motor base shall be completely welded and consist of frame and reinforcing side sheets to assure maximum strength and rigidity.

J. Submittals for approval of equipment shall include copies of outline drawings, AMCA Certified Sound Ratings, and percentage pressure-volume performance curves showing point of operation.

K. Approved Manufacturers:
1. Barry
2. Cook
3. Penn

PART 6 - EXECUTION

6.1 INSTALLATION

A. Anchor fan units securely to structure or curb.

END OF SECTION 23 3400

SECTION 233713 - AIR OUTLETS & INLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Furnish and install wall supply registers, transfer grilles, return air grilles, soffit grilles, ceiling diffusers, louvers connected to ductwork, and registers as described in Contract Documents.

PART 2 - PRODUCTS

2.1 GRILLES & REGISTERS

A. Approved Manufacturers:
   1. Price
   2. Anemostat
   3. Krueger
   4. Titus
   5. Tuttle & Bailey

2.2 LOUVERS

A. Extruded aluminum, with blades welded or screwed into frames and 1/2 inch mesh 16 gauge aluminum bird screen.

B. Frames shall have mitered corners.

C. Louvers shall be recessed, flanged, stationary, or removable as noted on Drawings.

D. Approved Manufacturers:
   1. Airolite
   2. American Warming
   3. Arrow
   4. Industrial Louvers
   5. Ruskin
   6. Vent Products

2.3 SPIN-IN FITTINGS

A. Low pressure round take-offs to diffusers shall be made with spin-in fittings. They shall incorporate a manual balancing damper. The damper shall be spring loaded and a positive locking wing nut shall secure the damper position.

B. Approved Manufacturers:
   1. Sheet metal fittings: Genflex DB-1DEL, Hercules

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor securely into openings.

B. Install with screws to match color and finish of grilles and registers.

C. Touch-up any scratched finish surfaces.

D. Install in accordance with manufacturer's instructions.

E. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

F. Install diffusers to ductwork with air tight connection.

G. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

H. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9000.

END OF SECTION 233713

SECTION 23 3813 – KITCHEN HOOD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

A. Furnish and install kitchen hood as described in Contract Documents.

B. Servicing disconnect, final connection and reconnection of shipping joints is by electrical contractor.

1.3 QUALITY ASSURANCE

A. Canopy is to be listed by Underwriter's Laboratories, Inc. as "self-contained automatic damper and hood assembly for restaurant cooking appliance."

B. Canopy is to comply with requirements of NFPA Bulletin #96, NSF and requirements of local authority having jurisdiction.

C. Fire extinguishing system and canopy is to comply with all applicable sections of NFPA #17 and #96.

D. Light fixtures to be U.L. listed specifically for use in commercial kitchen exhaust canopies and to comply with the requirements of the National Electrical Code.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Canopy is to be sized as shown on the drawings.

B. Canopy interior is to be fabricated of #18 ga. S/S where exposed, and enclosed by an integral makeup air shell fabricated of #18 ga. S/S where exposed.

C. Makeup air shell fitted with perforated SS face.

D. Full compliment of U.L. classified, accessible, S/S removable grease extractor. Provide proper S/S spacers and integral pitched gutter with removable cup located beneath baffle row.

E. Vapor proof incandescent light fixtures on maximum 4'-0" centers factory installed and wired to junction box on top of canopy. All wiring to be outside the grease areas of exhaust canopy.

F. Each canopy to be fitted with exhaust collars and supply collars. Exhaust collars to be fitted with U.L. listed fire damper assemblies.

G. Top of makeup air shell fitted with anchors for 1/2" threaded rods. Hanger rods are furnished by installing contractor. Provide offset wall clip at rear for mounting.

H. Factory installed liquid Ansul R-102 chemical fire suppression system providing surface, duct and plenum protection. System to consist of chemical tank mounted at location approved by local authorities as high up as possible to allow head clearance. System is to include all necessary interconnecting piping and cable runs between the nozzles, fusible links, gas valve, manual release, and the location of the chemical cylinder. Install, where directed by local authorities, a remote manual release station. All exposed piping to be chrome plated or S/S jacketed.

I. Micro-switch in chemical tank for shutoff of electric heated cooking appliances. Power shutdown devices and interwiring of same are by the electrical contractor. Electrical contractor to verify with local authorities the items of equipment requiring power shutdown. Provide gas shutoff valve for shutoff of all gas fired cooking appliances. Valve furnished loose to plumbing contractor for installation by him into incoming gas line. This contractor is to co-ordinate valve size and location with plumbing contractor.

J. Ductwork to canopy shall consist of roof curb, roof top plenum assembly, inlet duct, and interwiring between exhaust fan, makeup air unit and central panel on wall. Roof curb fabricated of heavy gauge galvanized steel 8" high with welded corners and insulated with 1 1/2" fiberglass. Size to suit plenum assembly. Supply ductwork fabricated of #18 ga. galvanized steel, lined with 1/2" coated fiberglass. Finish exterior ductwork in grey enamel. Exhaust duct shall be fabricated of #16 ga. galvanized steel with all seams welded with a continuous external weld. Exhaust duct sized to provide 1500 FPM minimum velocity.

K. Ventilator control panel for wall mounting with switches and indicator lights for system "on-off" and heat "on-off" functions, control dial for varying discharge air temperature and switch for hood light fixture.

L. Necessary motor overload controls and starters for exhaust and supply fans, fully wired into systems. All controls mounted within rain tight cabinet.

M. Approved Manufacturers:
1. Greenheck
2. Econ-Air
3. K-Tech
4. Captive Air

PART 3 - EXECUTION

3.1 FIELD QUALITY ASSURANCE

A. Fire Extinguishing system and canopy is to be installed in full compliance with requirements of local authority having jurisdiction.

B. Job site work shall be performed by or under the supervision of a qualified factory authorized Ansul dealer.

C. Contractor to co-ordinate with architect and/or general contractor to determine exact placement of roof curb to avoid or adapt to physical obstructions and conditions.

D. Canopy manufacturer shall dispatch a factory trained technician to the job site to start-up, adjust and balance system. He shall instruct the owner's agent in the care, operation and maintenance of the system.

E. Type I Hood shall be installed with a clearance to combustibles of not less than 18″, that is, unless the gypsum wallboard or ½” thick or thicker cementitious wallboard attached to noncombustible structures is provided with a smooth, cleanable, nonabsorbent and noncombustible material installed between the hood and the gypsum or cementitious wallboard over an area extending not less than 18 inches in all directions from the hood.

END OF SECTION 23 3813

SECTION 23 3815 – KITCHEN HOOD MAKE-UP AIR UNIT AND EXHAUST FAN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

A. Furnish and install make-up air unit and exhaust fan as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Arranged to supply 100% outside air and have capability of raising air temperature a minimum of 65 deg. F.

B. Direct gas fired with direct spark igniter and flame sensing rod. Combustion efficiency shall provide discharge air with an average concentration of less than 5 PPM of carbon monoxide.

C. Makeup air unit with intake hood, filter section, cleanable filters, automatic outside air damper and mounting base.

D. Necessary controls to monitor discharge temperature via a hood mounted dial control. Packaged wiring between hood and make-up air unit shall be provided.

E. Unit fan and heat "off-on" shall be provided by switches with appropriate indicator lights mounted in ventilator control cabinet.

F. Unit to be provided with contactors and proper motor protection and disconnects with single point electrical connection for the control of both exhaust and supply fans.

G. Designed for outdoor operation, with hinged panels for easy servicing access to motor, drive, burners and control without the use of tools. Provide insulated cabinet with metal on heated air side.

H. Supplied with a wide range burner having a modulating turndown ration of 30 to 1. Adjustable profile base plates shall be located upstream from blower and provided and sized to maintain the required velocity across the line burner. The burner assembly and gas manifold shall be completely prepiped and factory tested prior to shipment and controlled by a maxitrol modulating system.

I. Exhaust fan:
   1. Spun aluminum upblast type
   2. UL rated for kitchen hood exhaust
   3. Adjustable belt drive
   4. Non-overloading wheel
   5. Motor is to be mounted outside exhaust airstream in a ventilated motor compartment.

J. Approved Manufacturers:
   1. Greenheck
   2. Gaylord
   3. Reznor

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unit to set upon one piece combination roof curb provided by equipment contractor to handle both the make-up air heater and the exhaust fan.

END OF SECTION 23 3815

SECTION 23 4100 – DISPOSABLE FILTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0100 apply to this Section.

1.2 SUMMARY

A. Furnish and install filters used in mechanical equipment.

PART 2 - PRODUCTS

2.1 UNIT FILTERS

A. Filters shall match the required filter rack size and be throw-away type as recommended by Manufacturer. Provide one set of spare filters per unit size and type.

END OF SECTION 23 4100

SECTION 23 5414 – DIRECT GAS FIRED MAKE-UP AIR UNIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 23 0501 apply to this Section.

1.2 SUMMARY

A. Provide a direct gas fired make-up air unit as shown on plans.

PART 2 - PRODUCTS

2.1 AIR MAKE-UP UNIT

A. Air make-up unit shall be Titan Air Incorporated or approved equal equipped with the following features:
   1. Blowers: Blowers shall be centrifugal, forward curved, double width, double inlet type mounted on a solid turned, ground and polished steel shaft with self-aligning bearings.
   2. Equipment Casing: Equipment casing to be (18 ga.) paint lock around an integral support frame of structural angle. Equipment shall be primed with acrylic enamel primer and a finish coat of acrylic enamel paint. Finish color to be Titan Industrial Gray.
   3. Unit Configuration: Unit configuration shall be horizontal, horizontal discharge. Right controls (facing control vestibule, discharge is right).
   4. Burner: Burner to be direct fired as manufactured by Midco International. Designed to operate with an air velocity of 2,850 FPM across the stainless steel air baffles. Burner to be designed to provide 100% thermal efficiency throughout the life of the equipment. Burner shall be of a design that produces less than 5 ppm CO throughout its modulating range. Turn down ratio of the burner shall be minimum of 25:1.
   5. Gas Train: Gas train shall be constructed to meet (Standard A.N.S.I., Factory Mutual, Industrial Risk insurance or a combination of these.) All gas train components shall be selected to operate at a minimum four PSIG gas pressure.
   6. Temperature Control: Temperature control shall be digital discharge temperature, Maxitrol Series 94.
   7. With the exception of indoor hanging equipment, all normal installations will have control vestibule accessible without the aid of service platforms or ladders.
   8. Optional Accessories to include:
      a. Motorized intake damper
      b. Unit casing insulation
      c. Interior liner
      d. Vibration isolation - neoprene type: blower/motor
   9. The factory packaged frequency drive air make-up shall operate from pressure differential sensed by a Dwyer 3000 series Photohelic.
   10. Optional Controls to include:
      a. Burner "on-off" ductstat (economizer)
      b. Circuit analyzer
      c. Operating lights
      d. Clogged filter light
      e. Low gas pressure switch
      f. High gas pressure switch
      g. Proof of closure
      h. Ionized smoke detector
      i. Low fire start
   11. Unit to be ETL listed under ANSI Z83.18 (1987), (covering direct fired industrial heaters) as packaged variable frequency drive systems. Field conversion of listed air make-up will not be acceptable.

END OF SECTION 23 5414

END OF DIVISION 23

DIVISION 26 - ELECTRICAL

26 0000 ELECTRICAL

26 2000 LOW (LINE) VOLTAGE DISTRIBUTION

264000 ELECTRICAL EQUIPMENT PROTECTION

26 5000 LIGHTING

26 6000 AUXILIARY SYSTEMS

END OF TABLE OF CONTENTS

SECTION 26 0501 - COMMON ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. General electrical system requirements and procedures.
   2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
   3. Make electrical connections to equipment provided under other Sections.
   4. Furnish and install Penetration Firestop Systems at electrical system penetrations as described in Contract Documents.

B. Related Sections:
   1. Division 07: Quality of Penetration Firestop Systems to be used on Project and submittal requirements.

1.2 SUBMITTALS

A. Product Data:
   1. Provide following information for each item of equipment:
      a) Catalog Sheets.
      b) Assembly details or dimension drawings.
      c) Installation instructions.
      d) Manufacturer's name and catalog number.
      e) Name of local supplier.
   2. Furnish such information for following equipment:
      a) Section 26 2413: Switchboards.
      b) Section 26 2417: Panelboards
      c) Section 26 2726: Wiring devices.
      d) Section 26 2816: Enclosed switches and circuit breakers.
      e) Section 26 4313: SPD for Panelboards
      f) Section 26 5100: lighting fixtures.
   3. Do not purchase equipment before approval of product data.
   4. Submit in electronically in PDF format, Submittals shall be divided into Specification Sections and shall be electronically organized. Submittals shall specifically indicate items that are to be used, Generic submittals will be rejected.

B. Quality Assurance / Control:
   1. Report of site tests, before Substantial Completion.

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
   2. Material and equipment provided shall meet standards of NEMA or UL, or ULC, CSA, or EEMAC and bear their label wherever standards have been established and label service is available.

B. Materials and equipment provided under following Sections shall be by same Manufacturer:
1. Sections 26 2416, 26 2816, and 26 2913: Panelboards, Enclosed Switches And Circuit Breakers, and Enclosed Controllers.

C. Contractor shall obtain all permits and arrange all inspections required by local codes and ordinances applicable to this Division.

1.4 OWNER'S INSTRUCTIONS

A. Provide competent instructor for time required to adequately train maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

1.5 OPERATION AND MAINTENANCE MANUALS

A. Prepare and submit (4) four complete copies of the O & M Manuals—manuals to contain information listed below. Place each manual in a tabbed three-ring binder upon completion of the project.
1. Operation and Maintenance manual must contain the following items:
a) Copies of reviewed shop drawings.
b) Letter of 1-year guarantee of workmanship.
c) Copy of voltage and ammeter readings.
d) Copy of letter verifying owner’s receipt of spare parts.

1.6 GUARANTEE

A. The following guarantee is a part of this specification and shall be binding on the part of the Contractor:

“The Contractor guarantees that this installation is free from mechanical defects. He agrees to replace or repair, to the satisfaction of the Owner’s Representative, any part of this installation which may fail or be determined unacceptable within a period of one (1) year after final acceptance.”

1.7 RECORD DRAWINGS

A. During the course of construction, the Electrical Contractor shall maintain a set of drawings upon which all deviations from the original layout are recorded. These marked-up prints shall be turned over to the Architect/Engineer at the conclusion of the work.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. All relocations, reconnections, and removals are not necessarily indicated on Drawings. All such work shall be included without additional cost to Owner.

B. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

3.2 INSTALLATION

A. General:
   1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
   2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough-in.
      a. Notify Architect of conflicts before beginning work.
      b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.
   3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.

B. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

3.3 FIELD QUALITY CONTROL

A. Site Tests: Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.

B. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplates current rating and size of thermal overload unit installed for each motor.

END OF SECTION

SECTION 26 0502 - ELECTRICAL DEMOLITION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Includes But Not Limited To
   1. Demolition involving electrical system as described in Contract Documents.

C. Related Sections
   1. Section 260501 – Common Electrical Requirements
   2. New and replacement work specified in appropriate specification Section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. All relocations, reconnections, and removals are not necessarily indicated on Drawings. All such work shall be included without additional cost to Owner.

3.2 PREPARATION

A. Disconnect equipment that is to be removed or relocated. Carefully remove, disassemble, or dismantle as required, and store in approved location on site, existing items to be reused in completed work.

B. Where affected by demolition or new construction, relocate, extend, or repair raceways, conductors, outlets, and apparatus to allow continued use of electrical system. Use methods and materials as specified for new construction.

3.3 PERFORMANCE

A. Perform drilling, cutting, block-offs, and demolition work required for removal of necessary portions of electrical system. Do not cut joists, beams, girders, trusses, or columns without prior written permission from Architect.

B. Remove concealed wiring abandoned due to demolition or new construction. Remove circuits, conduits, and conductors that are not to be re-used back to next active fixture, device, or junction box.

C. Patch, repair, and finish surfaces affected by electrical demolition work, unless work is specifically called for under other Sections of the specifications.

3.4 CLEANING

A. Remove obsolete raceways, conductors, apparatus, and lighting fixtures promptly from site and dispose of legally.

END OF SECTION

SECTION 26 0503 - EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Electrical connections to equipment specified under other sections or funished by Owner.

1.02 RELATED WORK

A. In the even of conflict regarding equipment wiring system requirements between this Section and any other section, the provisions of this Section shall govern.

PART 2 - PRODUCTS

As described in the related sections.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 PREPARATION

A. Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of connections, voltage, number of phases, and ampacity. Coordinate details of equipment connections with supplier and installer.

3.03 INSTALLATION

A. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit in damp or wet locations and for connections to vibrating equipment. Make flexible connections to vibrating equipment of sufficient length to form a loop to restrict transmission of noise to structural elements or to the air.

C. Install prefinished cord set or use attachment plug with suitable strain-relief clamps. Refer to Section 26 2726, Wiring Devices, for details.

D. Make wiring connections in control panel or in wiring compartment of prewired equipment in accordance with manufacturer’s instructions. Provide interconnecting wiring where indicated. Tag all interconnecting wiring to identify source and destination equipment and terminal numbers. Refer to Section 26 0553, Electrical Identification, for details.

END OF SECTION

SECTION 26 0519 - LINE VOLTAGE CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Quality of conductors used on Project except as excluded below.

B. Related Sections:
   1. Section 26 0501: Common Electrical Requirements.

1.2 DEFINITIONS

A. Line Voltage: Over 70 Volts.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Line Voltage Conductors:
   1. Copper with AWG sizes as shown:
      a. Minimum size shall be No. 12 except where specified otherwise.
      b. Conductor size No. 8 and larger.
   2. Insulation:
      a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg C).
      b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg C).
      c. Higher temperature insulation as required by NEC or local codes.
      d. Type TC cable is acceptable for use in cable trays only.
   3. Colors:
      a. Refer to Section 26 0553 Electrical Identification for colors for conductors.
      b. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.
      c. For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.

B. Line Voltage Cables:
   1. Metal Clad Cable (MC) may be used as restricted below.
      a. Copper Conductors
      b. Use only indoor, dry locations where:
         1) Not subject to damage.
         2) Not in contact with earth.
      c. Not in concrete.
      d. Is allowed by local codes.
      e. Not Allowed for Homeruns (Homeruns shall be Conduit with Conductors).

C. Standard Connectors:
   1. Conductors No. 8 And Smaller: Steel spring wire connectors.
   2. Conductors Larger Than No. 8: Pressure type terminal lugs.
   3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.

D. Terminal blocks for tapping conductors:
   1. Terminals shall be suitable for use with 75 deg C copper conductors.
   2. Acceptable Products:
      a. 16323 by Cooper Bussmann, St Louis, MO www.bussmann.com
      b. LBA363106 by Square D Co, Palatine, IL www.squared.com.
      c. Equal as approved by Engineer before bidding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Conductors and cables shall be continuous from outlet to outlet.
   2. Do not use direct burial cable.

B. Line Voltage Conductors (Over 70 Volts):
   1. Install conductors in raceway except where specifically indicated otherwise. Run conductors of different voltage systems in separate conduits.
   2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Drawings.
   3. Multi-wire Branch Circuits (Common Neutral) shall **NOT** be utilized, a dedicated neutral shall be ran with every homerun circuit.
   4. Pulling Conductors:
      a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
      b. Do not use heavy mechanical means for pulling conductors.
      c. Use only listed wire pulling lubricants.

END OF SECTION

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install grounding for electrical installation as described in Contract Documents except as excluded below.

B. Related Sections:
   1. Section 26 0501: Common Electrical Requirements.

1.2 QUALITY ASSURANCE

A. Pre-Installation Conference: Participate in pre-installation conference specified in Section 03 3111.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Size materials as shown on Drawings and in accordance with applicable codes.

B. Grounding And Bonding Jumper Conductors: Bare copper or with green insulation.

C. Make grounding conductor connections to ground rods and water pipes using approved bolted clamps listed for such use.

D. Service Grounding Connections And Cable Splices:
   1. Make by compression type connectors designed specifically for this purpose.
   2. Acceptable Products:
      a. Burndy
      b. Thomas & Betts.
      c. Equal as approved by Architect before bidding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work: Coordinate with Section 03 3111 in installing grounding conductor and placing concrete. Do not allow placement of concrete before Architect's inspection of grounding conductor installation.

B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
   1. Electrical service, its equipment and enclosures.

2. Conduits and other conductor enclosures.
3. Neutral or identified conductor of interior wiring system.
4. Main panelboard, power and lighting panelboards.
5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.

C. Grounding connection to main water supply shall be accessible for inspection and made within 6 inches of point of entrance of water line to building. Provide bonding jumpers across water meter and valves to assure electrical continuity.

D. Provide concrete-encased electrode system by embedding 20 feet minimum of No. 2/0 bare copper conductor in concrete footing, 2 inches minimum below concrete surface. Extend No. 2/0 copper conductor to main panel as shown on Drawings.

E. Ground identified common conductor of electrical system at secondary side of main transformer supplying building. Ground identified grounded (neutral) conductor of electrical system on supply side of main service disconnect.

F. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding 72 inches in length, and in flexible conduit connecting to mechanical equipment.

G. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.

H. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.

I. Connect equipment grounds to building system ground.
1. Use same size equipment grounding conductors as phase conductors up through #10 AWG.
2. Use NEC Table 250-122 for others unless noted otherwise in Drawings.

J. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.

K. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.

L. Do not bond neutral conductor of emergency generator set to generator set frame at generator location, unless utilizing 4-pole transfer switches. Refer to drawings.

M. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.

N. Ground each separately derived system neutral to nearest ground per NEC and local inspector.

O. Provide and install a #6 ground conductor from main service ground to telephone board. Terminate ground at board on a grounding bar.

P. Provide a separate, insulated equipment green grounding conductor in all feeder and branch circuits. Terminate each end on a grounding lug, bus, or bushing and to all metallic enclosures. A conduit ground is not acceptable. Install grounding bushings on both ends of all feeder conduit and bond to ground system.

3.2 FIELD QUALITY CONTROL

A. Inspections: Notify Architect for inspection two days minimum before placing concrete over grounding conductor.

END OF SECTION

SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
   2. Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.
   3. Furnish and install main telephone service raceway as described in Contract Documents and to comply with telephone company requirements.
   4. Furnish and install main electrical service raceway to comply with electrical utility company requirements.

B. Related Sections
   1. Section 26 0501: General Electrical Requirements.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Raceway And Conduit:
   1. Minimum Sizes:
      a. 3/4 inch for exterior underground use.
      b. 3/4 inch minimum Homeruns, 1/2" minimum elsewhere, unless indicated otherwise.
   2. Types: Usage of each type is restricted as specified below by product.
      a. Galvanized rigid steel (RMC) or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
      b. Galvanized Electrical Metallic Tubing (EMT):
         1) Allowed for use only in indoor dry locations where it is:
            a) Not subject to damage.
            b) Not in contact with earth.
            c) Not in concrete.
         2) Flexible steel conduit or metal-clad cable required for final connections to indoor mechanical equipment.
      c. Schedule 40 Polyvinyl Chloride (PVC) Conduit:
         1) Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.
      d. Listed, Liquid-Tight Flexible Metal Conduit:
         1) Use in outdoor final connections to mechanical equipment, length not to exceed 36 inches.
   3. Prohibited Raceway Materials:
      a. Aluminum conduit.
      b. Armored cable type AC (BX) cable.

B. Raceway And Conduit Fittings:
   1. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
   2. EMT:
      a. Compression type.
      b. Steel set screw housing type.
   3. PVC Conduit:
      a. PVC type. Use PVC adapters at all boxes.
      b. PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
   4. Flexible Steel Conduit: Screw-in type.
   5. Liquid-tight Flexible Metal Conduit: Sealtite type.
   6. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
   7. Prohibited Fitting Materials:
      a. Crimp-on, tap-on, indenter type fittings.
      b. Cast set-screw fittings for EMT.
      c. Spray (aerosol) PVC cement.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
   1. Provide metal supports and other accessories for installation of each box.
   2. Equip ceiling and bracket fixture boxes with fixture studs where required.
   3. Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
   4. Telephone / data outlet boxes shall be 4sq. deep boxes with single-gang mudring where two or more cables come to one box.

2.2 MANUFACTURERS

A. Contact Information:
   1. Cooper B-Line, Highland, IL www.bline.com.
   2. Hubbell Incorporated, Milford, CT www.hubbell-wiring.com.
   3. Square D, Palatine, IL www.squared.com.
   4. Steel City, Div Thomas & Betts, Memphis, TN www.tnb.com.
   5. Thomas & Betts, Memphis, TN www.tnb.com.
   6. Walker Systems Inc, Williamstown, www.wiremold.com.
   7. Wiremold Co, West Hartford, CT www.wiremold.com.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

3.2 INSTALLATION

A. Interface With Other Work:
   1. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
   2. Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.
      a. Coordinate location of outlet for water cooler with Division 22.
      b. Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlet under his direction.

3. Coordinate installation of floor boxes in carpeted areas with carpet installer to obtain carpet for box doors.
4. Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.

B. Conduit And Raceway:
1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
2. Keep raceway runs 6 inches minimum from hot water pipes.
3. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
   a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
   b. Radius of curve shall be at least minimum indicated by NEC.
4. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
5. Install insulated bushings on each end of raceway 1-1/4 inches in diameter and larger, and on all raceways where low voltage cables emerge. Install expansion fittings where raceways cross building expansion joints.
6. Run two spare conduits from each new panelboard to ceiling access area or other acceptable accessible area and cap for future use.
7. Route conduit through roof openings for piping and ductwork where possible; otherwise. All roof penetrations shall be flashed, counter flashed and sealed per Roofing Contractor. Coordinate all roof penetrations with the Roofing Contractor.
8. Provide nylon pull string with printed footage indicators secured at each end of each empty conduit, except sleeves and nipples. Identify with tags at each end the origin and destination of each empty conduit, and indicate same on all empty or spare conduits on the as-built drawings.
9. Install expansion-deflection joints where conduit crosses building expansion, seismic, or structural isolation break (SIB) joints.
10. Where conduit penetrates fire-rated walls and floors, seal opening around conduit with UL-listed foamed silicone elastomer compound. Fill void around perimeter of conduits with nonmetallic nonshrink grount in all concrete or masonry walls.
11. Bend PVC conduit by hot box bender and, for PVC 2 inches in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
12. Installation In Framing:
    a. Do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
    b. Holes shall be one inch diameter maximum.
13. Underground Raceway And Conduit:
    a. Bury underground raceway installed outside building 24 inches deep minimum.
    b. Bury underground conduit in planting areas 18 inches deep minimum. It is permissible to install conduit directly below concrete sidewalks, however, conduit must be buried 18 inches deep at point of exit from planting areas.
14. Conduit And Raceway Support:
    a. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
    b. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:
       1) Expansion shields in concrete or solid masonry.
       2) Toggle bolts on hollow masonry units.

3) Wood screws on wood.
4) Metal screws on metal.

15. Prohibited Procedures:
    a. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
    b. Installation of raceway that has been crushed or deformed.
    c. Use of torches for bending PVC.
    d. Spray applied PVC cement.
    e. Boring holes in truss members.
    f. Notching of structural members.
    g. Supporting raceway from ceiling system support wires.

C. Boxes:
1. Boxes shall be accessible and installed with approved cover.
2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
4. Install outlets flush with finished surface and level and plumb.
5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
7. Install air / vapor barrier back boxes behind outlet boxes that penetrate vapor barrier.
8. Location:
    a. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of switch boxes from jamb shall be within 6 inches of door jamb.
    b. Arrange boxes for ceiling light fixtures symmetrically with respect to room dimensions and structural features.
    c. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
    d. Center ceramic tile boxes in tile.

END OF SECTION

SECTION 26 0553

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Nameplates and labels.

B. Wire and cable markers.

1.02 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for electrical identification.

1. Section 26 0501 - Basic Electrical Requirements

B. In the event of conflict regarding electrical identification requirements between this Section and any other section, the provisions of this Section shall govern.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, minimum 3/16 inch high white letters on a black background.

B. Nameplates (Emergency Equipment): Engraved three-layer laminated plastic, minimum 3/16 inch high white letters on a red background.

C. Wire and Cable Markers: Split sleeve or tubing type. Cloth or wraparound adhesive types not approved.

D. Conductor-color Tape: Colored vinyl electrical tape.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates and labels parallel to equipment lines.

C. Secure nameplates to equipment fronts. Secure nameplate to outside face of panelboard doors.

D. Embossed tape will not be permitted for any application.

E. Electrical Contractor shall write the circuit number to which each device is connected on the inside of the box (clearly visible when device is removed) and on the backside of each coverplate. Use a permanent black marker.

3.02 WIRE IDENTIFICATION

A. Conductors for power circuits to be identified per the following schedule.

	System Voltage	
Conductor	480Y/277V	208Y/120V
Phase A	Brown	Black
Phase B	Orange	Red
Phase C	Yellow	Blue
Neutral	Grey	White
Grounding	Green	Green
Isolated Ground	Green with yellow stripe	Green with yellow stripe
Switchleg (lighting)	Purple	Pink

3.03 NAME PLATE ENGRAVING SCHEDULE

A. Provide nameplates of minimum letter height as scheduled below.

B. Panelboards, Switchboards and Motor Control Centers:
1. 1st Line - Equpment Name: 1/4 inch Lettering.
2. 2nd Line - Voltage Rating: 3/16 inch Lettering
3. 3rd Line - Feed Source: 3/16 inch Lettering
4. 4th Line - Available Fault Current: 3/16 inch Lettering
5. Nameplate Examples:

PANEL: HA
480Y/277V
FEED FROM: MSB-2
SCA: 18,560 AMPS

SWBD: MSB
480Y/277V
FEED FROM: UTIL.
SCA: 35,680 AMPS

MCC-A: SEC. 1
480V-3P
FEED FROM: MSB-2
SCA: 18,560 AMPS

C. Individual Circuit Breakers, Switches, and Motor Starters in Switchboards, and Motor Control Centers:
1. 1st Line - Load Served: 1/4 inch Lettering.
2. 2nd Line - Location of Load: 3/16 inch Lettering
3. Nameplate Examples:

PUMP: P-1
MECH. RM 112

D. Individual Circuit Breakers, Enclosed Switches, and Motor Starters:
1. 1st Line - Load Served: 1/4 inch Lettering.
2. 2nd Line - Voltage Rating: 3/16 inch Lettering
3. 3rd Line - Feed Source: 3/16 inch Lettering
4. Nameplate Examples:

FAN: F-1
480V-3P
FEED FROM: HM-1,3,5

E. Transformers: 3/16 inch; identify equipment designation. 1/8 inch; identify primary and secondary voltages, primary source, and secondary load and location.
   1. 1st Line - Equpment Name: 3/16 inch Lettering.
   2. 2nd Line - Voltage Rating: 1/8 inch Lettering
   3. 3rd Line - Feed Source: 1/8 inch Lettering
   4. 4th Line - Available Fault Current: 3/16 inch Lettering
   5. Nameplate Example:

XFMR:TA
480-208Y/120V
FEED FROM: HA-2
SUPPLIES: PNL LA
SCA: 18,560 AMPS

END OF SECTION

SECTION 26 2200 - DRY TYPE TRANSFORMERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Dry type two winding transformer. Sizes and Quantities as per plans.

1.02 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for secondary grounding.
   1. Section 26 0501 - Basic Electrical Requirements.

B. In the event of conflict regarding dry type transformer requirements between this Section and any other section, the provisions of this Section shall govern.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store in warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

B. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow it handled in inclement weather.

1.04 SUBMITTAL

A. Provide a separate set of shop drawings for each transformer supplied.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DRY TYPE TWO WINDING TRANSFORMERS

A. General Electric Company
B. Square D Company (Sorgel)
C. ITE
D. Federal Pacific

2.02 DRY TYPE TWO WINDING TRANSFORMERS

A. Dry Type Transformers: NEMA ST 20; factory-assembled, air cooled dry type transformers.

B. Insulation system and average winding temperature rise for rated kVA as follows:

Rating	Class	Rise (degree C)
16-500	220	150

C. Case temperature shall not exceed 35 degrees C rise above ambient at its warmest point.

D. Winding Taps, Transformers 15 kVA and Larger: NEMA ST 20. Two 5 percent taps above and below full rated voltage.

E. Transformers 75 kVA and larger, provide an impedance of 4.5 percent minimum.

F. Sound Levels: NEMA ST 20.

G. Sound Levels: Maximum sound levels are as follows:

kVA Rating	Sound Level
1-5	30 db
6-25	40 db
26-150	42 db
151-225	43 db
226-300	47 db
301-500	51 db

H. Basic Impulse Level: 10 kV

I. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

J. Mounting: Transformers 75 kVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 25 kVA shall be suitable for floor or trapeze mounting.

K. Coil Conductors: Continuous windings with terminations brazed or welded.

L. Enclosure: NEMA ST 20; Type 1. Provide lifting eyes or brackets.

M. Isolate core and coil from enclosure using vibration-absorbing mounts.

N. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

PART 3 - EXECUTION

3.01 GENERAL

A. Transformers shall be floor mounted except where indicated on the Drawings to be suspended or wall mounted.

B. Suspended transformers shall be mounted on hanger rods with a spring isolator in each rod.

C. Floor mounted transformers shall be mounted on a 4" high concrete housekeeping pads. Provide neoprene pads between transformer legs and housekeeping pad and anchor transformer to floor.

D. Provide grounding electrode conductor from transformer secondary neutral to nearest copper ground bar or building steel.

E. Conduit connected to transformer shall be flexible metal conduit, 24 inches minimum length, 60 inches maximum length.

END OF SECTION

SECTION 26 2417 - PANELBOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Distribution panelboards.
B. Lighting and appliance branch circuit panelboards.

1.02 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for panelboards.
   1. Section 26 0501 - Basic Electrical Requirements.
   2. Section 26 0553 - Electrical Identification.

B. In the event of conflict regarding panelboard requirements between this Section and any other section, the provisions of this Section shall govern.

1.03 SUBMITTALS

A. Provide the following in addition to the standard requirements: Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.04 SPARE PARTS

A. Keys: Furnish two each to Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Square D: I-Line, NQ and NF Series Only to match existing.

2.02 DISTRIBUTION PANELBOARDS

A. Panelboards: NEMA PB 1; circuit breaker type: FS W-P-115; Type I, Class I.

B. Enclosure: NEMA PB 1; Type and Mounting as indicated on panel schedule.

C. Provide cabinet front with concealed trim clamps and hinged door with flush lock. Finish in manufacturer’s standard gray enamel.

D. Provide Dist. panelboards with following:
   1. Bussing: [Aluminum or Copper]
   2. Rating: as indicated in panel Schedule
   3. Ground & Neutral Bus in all panelboards.
   4. Intergral Surge Protection Device

E. Minimum Integrated Short Circuit Rating: 22,000 amperes rms symmetrical for 240 volt Dist. panelboards; 42,000 amperes rms symmetrical for 480 volt Dist. panelboards, or as indicated in panel schedule.

F. Molded Case Circuit Breakers: NEMA AB 1; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as type HACR for air conditioning equipment branch circuits.

G. All Dist. Panelboards with circuit breakers rated 1200A or higher shall be furnished with Arc Energy Reduction Means as defined per NEC 240.87

H. Nameplates: Engraved three-layer laminated plastic, minimum 3/16 inch high white letters on a black background. Label to include panel identification, voltage and source. Label to be attached with screws.

2.03 LIGHTING & BRANCH CIRCUIT PANELBOARDS

A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.

B. Enclosure: NEMA PB 1; Type and Mounting as indicated on panel schedule.

C. Cabinet Size: 5-3/4 inches deep; 20 inches wide for 240 volt and less panelboards, 20 inches for 480 bolt panelboards.

D. Provide flush surface cabinet front with typewritten directory, concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with the following:
1. Bussing: [Aluminum or Copper]
2. Rating: as indicated in panel Schedule
3. Ground and Nuetral Bus in all panelboards.
4. Intergral Surge Protection Device

F. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards, or as indicated in panel schedule.

G. Molded Case Circuit Breakers: NEMA AB 1, FS W-C-375; [plug-on or bolt-on] type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

H. Nameplates: Engraved three-layer laminated plastic, minimum 3/16 inch high white letters on a black background. Label to include panel identification and voltage. Label to be attached with screws.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install panelboards plumb in conformance with NEMA PB 1.1.

B. Height: 78 inches to top.

C. Adjust trim to cover all openings.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard and Distribution panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

3.02 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multiwire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

SECTION 26 2726 - WIRING DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Wall switches.
B. Receptacles.
C. Device plates and box covers.
D. Cords and caps.

1.02 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for wiring devices.
   1. Section 26 0501 - Basic Electrical Requirements.

B. In the event of conflict regarding requirements for wiring devices between this Section and any other section, the provisions of this Section shall govern.

1.03 DESIGN REQUIREMENTS

A. FS W-C-596 - Electrical Power Connector, Plug, Receptacle, and Cable Outlet.

B. FS W-S-896 - Switch, Toggle.

C. NEMA WD 1 - General Requirements for Wiring Devices.

D. NEMA WD 6 - Wiring Devices - Dimensional Requirements.

PART 2 - PRODUCTS

2.01 WALL SWITCHES

A. Acceptable Manufacturers:

MFG.	1-Pole	3-Way	4-Way	Pilot Light
Hubbell	1221-*	1223-*	1234-*	1221-P1 *
P & S	PS20AC1-*	PS20AC3-*	PS20AC4-*	
Levition	1221-*	1223-*	1224-*	
Cooper	AH1221-*	AH1223-*	AH1224-*	AH1221LT

B. Wall Switches for Lighting Circuits shall meet Federal Spec WS-896.
   1. AC general use snap switch with toggle rocker handle, Screw type terminals only.
   2. 20 Amperes and 120-277 Volts AC rated .
   3. *Color: As selected by Owner/Architect, Red if connected to an Emergency Circuit. (Standard colors shall include brown, gray, ivory, black or a white for all devices.)

C. Pilot Light Type: Red pilot handle; handle lighted when switch is ON.

D. Provide 3-way and 4-way switches of matching style, appearance and specification as indicated on drawings.

2.02 RECEPTACLES

A. Acceptable Manufacturers:

STANDARD				
MFG	**Duplex**	**GFI**	**USB**	**Tamper**
Hubbell	HBL5352*	GF20*L	USB20X2*	BR20*TR
P & S	5362*	2095-*		TR5362*
Leviton	5362*			
Cooper	5352*	VGF20*-AG	TR7746*	TR5362*

HOSPITAL GRADE				
MFG	**Duplex**	**GFI**	**USB**	**Tamper**
Hubbell	HBL8300H*	GFR8300H*L	USB8300*	
P & S	8300H*	2095HG*		TR63H*
Leviton	8300-H*			
Cooper	8300*	VGFH20*	TR8345*	TR8300*

B. Hospital Grade receptacles shall be used in all areas of Health Care Facilites as required by Article 517 of the lastest National Electrical Code (NEC).

C. Convenience and Straight-blade Receptacles: NEMA WD 1, Heavy Duty Specifiction Grade.

D. Locking-Blade Receptacles: NEMA WD 5.

E. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R.
   1. *Color: As selected by Owner/Architect. Receptacles on Emergency circuit shall be Red in color. (Standarad colors shall include brown, gray, ivory, black and white for all devices.)

F. Weatherproof Receptacles: GFI, UL weather-resistant listed Receptacle mounted in a cast steel box with gasketed, weatherproof device plate and In-Use Cover.

G. Specific-use Receptacle Configuration: NEMA WD 1 or WD 5; type as indicated on Drawings, brown nylon face.

H. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter. NEMA Type 5-20R.
   1. *Color: As selected by Owner/Architect. Receptacles on Emergency circuit shall be Red in color. (Standarad colors shall include brown, gray, ivory, black and white for all devices.)
   2. Feed-through type for downstream device protection.
   3. All receptacles indicated to be installed in a toilet room, bathroom, roof top, and outdoors or within 6 feet of a sink, basin, tub or floor sink shall be GFCI protected

2.03 SPECIFIC PURPOSE RECEPTACLES

A. NEMA WD 1 or WD 5; type as indicated on Drawings.

B. Isolated Ground Type: Straight blade type 5-20R as indicated on the Drawings. Grey nylon face.

C. Twist lock type. NEMA configuration as shown on the Drawings.

2.04 WALL PLATES

A. Color shall match device: As selected by Owner/Architect. Receptacles on Emergency circuit shall be Red in color. (Standarad colors shall include brown, gray, ivory, black and white for all devices.)

B. Material:
   1. Finished Spaces: Stainless Steel
   2. Unfinished Spaces: Galvanized Steel

C. All isolated ground receptacle covers shall bear the engraved phrase “ISOLATED GROUND”.

D. Engraved Plates: Same plate as specified herein. Provide with engraved characters 1/8 inch high characters (all letters in upper case) with filler of black color.

E. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device covers.

2.05 CORDS AND CAPS

A. Acceptable Manufacturers:
   1. Hubbell.
   2. Leviton.
   3. Pass and Seymour.
   4. Cooper

B. Straight-blade Attachment Plug: NEMA WD 1.

C. Locking-blade Attachment Plug: NEMA WD 5.

D. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.

E. Cord Construction: Oil-resistant thermoset insulated Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for hard usage in damp locations.

F. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wall switches 48 inches AFF, OFF position down.

B. Install convenience receptacles 18 inches AFF, 4 inches above backsplash, or as noted, in a vertical position with grounding pole down.

C. Install specific-use receptacles at heights shown on Contract Drawings.

D. Install convenience receptacles in 4 square box in a vertical position with the ground pole down.

END OF SECTION

SECTION 26 2816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Fusible Disconnect switches.
B. Nonfusible Disconnect switches.
C. Enclosures.

1.02 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for disconnect switches.
   1. Section 26 0501 - Basic Electrical Requirements.
   2. Section 26 0526 - Grounding.

B. In the event of conflict regarding individually enclosed low-voltage protective device requirements between this Section and any other section, the provisions of this Section shall govern.

1.03 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessor, and component indicated. Include dimensioned elevations, sections, weights, and manufacturer's technical data on features, performance, electrical characteristics, ratings, accessories and finishes.

1.04 QUALITY ASSURANCE

A. Source Limitations: Optain enclosed switches and circuit breakers, overcurrent protective devices, components and accessories within same product category from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Compenents, Devices and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency and marked for intended location and application.

D. Comply with NFPA 70.

1.05 COORDINATION

A. Coodinate layout and installation of switches, circuit breakers and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.06 SPARE PARTS

A. Provide fuses for switches, as required of classes, types and ratings needed to fulfill electrical requirements for services indicated. Provide spare fuses amounting to one spare fuse for each 10 installed but not less than three of any one type and size.

PART 2 - PRODUCTS

2.01 FUSIBLE SWITCHES

A. Manufacturer: Subjects to compliance with requirements, provide products of one of the following (for each type of switch):
   1. Square D Company
   2. General Electric (GE)
   3. Cutler-Hammer (Eaton)

B. Type HD, Heavy Duty, Single Throw, 240 or 600 VAC, 1200A and smaller: UL98 and NEMA KS 1, horsepower rated with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept two padlocks and interlocked with cover in closed position.

C. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper or aluminum conductors.
   2. Neutral Kit (where required): Internally mounted, insulated; capable fo being grounded and bonded; labeled for copper and aluminum neutral conductors.
   3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
   4. Lugs: Mechanical type, suitable for number, size and conductor material.

2.02 NONFUSIBLE SWITCHES

A. Manufacturer: Subjects to compliance with requirements, provide products of one of the following (for each type of switch):
   1. Square D Company
   2. General Electric (GE)
   3. Cutler-Hammer (Eaton)

B. Type HD, Heavy Duty, Single Throw, 240 or 600 VAC, 1200A and smaller: UL98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks and interlocked with cover in closed position.

C. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper or aluminum conductors.
   2. Lugs: Mechanical type, suitable for number, size and conductor material.

2.03 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturer: Subjects to compliance with requirements, provide products of one of the following (for each type of switch):
   1. Square D Company
   2. General Electric (GE)
   3. Cutler-Hammer (Eaton)

B. Molded-Case Circuit Breaker: NEMA AB 1 with interrupting capacity to meet available fault cureents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantanuous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frams sizes 250A and larger.
   2. Adjustable Instantaneuous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Current-Limiting Circuit Breakers: Frame sizes 400A and smaller and let-through ratings less than NEMA FU 1, RK-5.

C. Molded-Case Circuit Breaker Features and Accessories:
   1. Standard frame sizes, trip ratings and number of poles.
   2. Lugs: Mechanical style with compression lug kits suitable for number, size, trip ratings and conductor material.
   3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning and refrigerating equipment.
   4. Shunt Trip: 120V trip coil energized from seperate circuit, set to trip at 55% of rated voltage.
   5. Undervoltage Trip: Set to operate at 35% to 75% of rated voltage with field-adjustable 0.1 to 0.6 second time delay.

2.04 ENCLOSURES

A. NEMA AB 1 AND NEMA KS 1 to meed environmental conditions of installed location.
   1. Indoor Locations: NEMA 250, Type 1
   2. Outdoor Locations: NEMA 250, Type 3R
   3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
   4. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to recieve enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

3.02 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1 and NEMA PB 2.1 for installations of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. (Maximum Height: 78" to top of enclosure AFF). Anchor floor-mounting switches to concrete base.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels and brackets and temporary blocking of mobing parts from enclosures and components.

3.03 IDENTIFICATION

A. Enclosure Nameplates: Label each enclosure with engrabed nameplate as specified in Section 26 0553 Electrical Identification.

3.04 FIELD QUALITY CONTROL

A. Provide the following acceptance testing:
   1. Inspect mechanical and electrical connections.
   2. Verify switch and relay type and labeling verification.
   3. Inspect proper installation of type, size, quantity and arrangement of mounting or anchorage devices complying with manufactuer's certification.

3.05 ADJUSTING

A. Set field-adjustable switches and circuit breaker trip ranges.

3.06 CLEANING

A. On completion of installation vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION

SECTION 26 4313 - SURGE PROTECTION DEVICES FOR PANELBOARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the materials and installation requirements integrated Transient for Voltage Surge Suppressor (TVSS), also referred to as Surge Protective Device (SPD), in panelboards. These devices are used to protect AC electrical circuits from the effect of lightning induced currents, substation switching transients and internally generated transients resulting from inductive and or capacitive load switching.

1.02 REFERENCES

A. UL 1449 Second Edition 2005 - Transient Voltage Surge Suppressors

B. UL 1283 - Electromagnetic Interference Filters

C. ANSI/IEEE C62.41.1-2002 - IEEE Guide on the Surge Environment in Low Voltage (1000 V and Less) AC Power Circuits; C62.41.2-2002 - IEEE Recommended Practice on Characterization of Surge Voltages in Low Voltage AC Power Circuits; and C62.45-2002 - IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.

D. NEC 2005, Article 285

PART 2 - PRODUCT

2.01 SURGE PROTECTIVE DEVICE

A. Integral Surge Suppressor

1. TVSS or SPD shall be Listed in accordance with UL 1449 Second Edition 2005 and UL 1283, Electromagnetic Interference Filters.
2. Integrated surge protective devices (SPD) shall be Component Recognized in accordance with UL 1449 Second Edition, Revision 2/9/2005 Section 37.3 and 37.4 at the standard's highest short-circuit current rating (SCCR) of 200 kA, including intermediate level of fault current testing that will be effective 2/9/2007.
3. TVSS or SPD shall be tested with the ANSI/IEEE Category C High exposure waveform (20kV-1.2/50μs, 10kA-8/20μs).
4. TVSS shall provide suppression for all modes of protection: L-N, L-G, and N-G in WYE systems.
5. The manufacturer of the TVSS or SPD shall be the same as the manufacturer of the service entrance and distribution equipment in which the devices are installed and shipped. Also, this distribution equipment shall be fully tested and certified to the following UL standards:
    a) UL 67 = Panelboards,
    b) UL 845 = Motor Control Centers,
    c) UL 857 = Busway,
    d) UL 891 = Switchboards,
    e) UL 1558 = Low Voltage Switchgear.

6. Recommended TVSS or SPD ratings:
   a) Minimum surge current rating shall be 160 kA per phase (80 kA per mode) for service entrance and 80 kA per phase (40 kA per mode) for distribution applications.
   b) UL 1449 clamping voltage must not exceed the following:

VOLTAGE	L-N	L-G	N-G
240/120	800/400V	800/400V	400V
208Y/120	400V	400V	400V
480Y/277	800V	800V	800V
600Y/347	1200V	1200V	1200V

   c) Pulse life test: Capable of protecting against and surviving 5000 ANSI/IEEE Category C High transients without failure or degradation of clamping voltage by more than 10%.
7. TVSS or SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.
8. TVSS shall be constructed of one self-contained suppression module per phase.
9. Visible indication of proper TVSS or SPD connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable. The status of each TVSS or SPD module shall be monitored on the front cover of the enclosure as well as on the module. A push-to-test button shall be provided to test each phase indicator. Push-to-test button shall activate a state change of dry contacts for testing purposes.
10. TVSS or SPD shall be equipped with an audible alarm which shall activate when any one of the surge current modules has reached an end-of-life condition. An alarm on/off switch shall be provided to silence the alarm. The switches and alarm shall be located on the front cover of the enclosure.
11. A connector shall be provided along with dry contacts (normally open or normally closed) to allow connection to a remote monitor or other system. The output of the dry contacts shall indicate an end-of-life condition for the complete TVSS or SPD or module.
12. Terminals shall be provided for necessary power and ground connections.

2.02 MANUFACTURERS

A. Approved Vendors: Square D/Schneider Electric, Surgelogic IMA Series

END OF SECTION

SECTION 26 5100 – INTERIOR & EXTERIOR LIGHTING

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Interior luminaires and accessories
2. Emergency lighting & Exit Signs
3. Exterior lighting

B. DEFINITIONS:

1. Luminaire: A luminaire is a complete lighting unit including light source(s) and parts required to distribute the light, position and protect the light source(s), and connect the light source(s) to the power supply.
2. Average Life: The time after which 50 percent will have failed and 50 percent will have survived under specified operating and starting condition.

1.2 SUBMITTALS

A. Submit the following in accordance with project submittal procedures:

1. Interior Fixture Catalog Data: Submit catalog data describing luminaires, lamps, and ballasts. Include data substantiating that materials comply with specified requirements. Arrange data for luminaires in the order of fixture designation.
2. Exterior Fixture Catalog Data: Submit catalog data describing poles, luminaires, lamps, ballasts, and pole and luminaire finishes. Include data substantiating that materials comply with specified requirements. Arrange data for luminaires in the order of luminaire designation.
3. Performance Curves/Data:
   a. Submit certified photometric data for each type of luminaire.
   b. Submit supply-air, return-air, heat-removal, and sound performance data for air handling luminaires.
4. Drawings: Submit shop drawings for luminaries.

1.3 QUALITY ASSURANCE

A. Interior Lighting

1. Comply with the *National Electrical Code* (NEC) and the *International Building Code (IBC)* for installation requirements.

2. Provide luminaires listed and labeled by a nationally recognized testing laboratory (NRTL)

3. Use manufacturers that are experienced in manufacturing luminaires, lamps and ballasts similar to those indicated for this Project and have a record of successful in-service performance.

4. Coordinate luminaires, mounting hardware and trim with the ceiling system.

B. Emergency Lighting

1. Comply with ANSI/NFPA 70 - National Electrical Code (NEC), NFPA 101 - Life Safety Code, and the International Building Code (IBC) for components and installation.

2. Emergency lighting units and exit signs shall be NRTL-listed and labeled for their indicated use, and location on this project, by a Nationally Recognized Testing Laboratory (NRTL) in accordance with UL 924–Emergency Lighting and Power Equipment.

3. Use manufacturers that are experienced in manufacturing emergency lighting units similar to those indicated for this Project and have a record of successful in-service performance.

C. Exterior Lighting

1. Comply with the following codes and standards:

   a. National Electrical Code (NEC) for components and installation.

   b. International Building Code

2. Provide luminaires listed and labeled by a nationally recognized testing laboratory (NRTL) for the application, installation condition, and the environments in which installed.

3. Use manufacturers that are experienced in manufacturing poles, luminaires, lamps and drivers similar to those indicated for this Project and have a record of successful in-service performance.

1.4 RECEIVING, STORING AND PROTECTING

A. Receive, store, and protect, and handle products according to the following NECA National Electrical Installation Standards:

1. NECA/IESNA 500, *Recommended Practice for Installing Indoor Commercial Lighting Systems* (ANSI).

1.5 WARRANTY

A. Submit a warranty, mutually executed by the LED luminaire manufacturer and the installer, agreeing to replace LED luminaires that fail in materials or workmanship within five years, beginning on the date of substantial completion of project.

B. Manufacturer shall replace any luminaires that fail to operate properly within 60 months of the substantial completion date of project . Lens yellowing or hazing will be considered a failure.

C. Manufacturer shall replace any luminaries that experience housing or finish failure within 5 years of the substantial completion date of project

PART 2 PRODUCTS

2.1 SEISMIC PERFORMANCE REQUIREMENTS

A. The luminaires shall remain in place without separation of any parts when subjected to the design basis earthquake per Section 01 8734, *Seismic Qualification of Nonstructural Components (IBC)*

2.2 INTERIOR LUMINAIRES

A. Furnish interior luminaires that comply with requirements specified below, indicated on the Drawings, and as required to meet conditions of installation.

B. Metal parts shall be free from burrs and sharp corners and edges.

C. Metal components shall be formed and supported to prevent sagging and warping.

D. Steel parts shall be finished with manufacturer's standard finish applied over a corrosion-resistant primer. Finish shall be free from runs, streaks, stains, holidays or defects.

E. Doors and frames shall be smooth operating and free from light leakage under operating conditions. Relamping shall be possible without the use of tools. Doors, frames, lenses and diffusers shall be designed to prevent accidental falling during relamping and when secured in the operating position.

F. Lenses, diffusers, covers and globes shall be 100 percent virgin acrylic unless specified otherwise on the Drawings. Lenses shall have 0.125 inches minimum thickness. Lenses for fluorescent troffers shall be injection molded.

G. Luminaires shall conform to UL 1598 - *Luminaires*. Provide product with damp location listing or wet location listing as required by installation location.

H. Light diffusers, other than those made of metal or glass, used in air-handling light fixtures shall be listed and marked “Fixture Light Diffusers for Air-Handling Fixtures.”

2.3 INTERIOR LED LUMINAIRES

A. For LED lighting in interior spaces, use NRTL-listed 120V or 277V luminaires with the performance characteristics listed below:

1. Minimum luminaire efficacy per IES LM-79, *Approved Method: Electrical and Photometric Measurement of Solid-State Lighting Products*:

a. 90 lumens/watt for general lighting,

b. 50 lumens/watt for accent and display lighting, down-lighting, and special purpose lighting.

2. Correlated color temperature (CCT) per IES LM-79 and ANSI/NEMA/ANSLG C78.377, *Specification for the Chromaticity of Solid-State Lighting (SSL) Products*:

a. As indicated in the fixture schedule

3. LED Design life (L70): Not less than 50,000 hours per IES LM-80, *Approved Method: Measuring Lumen Maintenance of LED Light Sources*.

4. Driver System Design Life: Not less than the LED design life; note that the driver system includes all associated components, not just the driver integrated circuit. Driver system design life is defined as when 2 percent of the systems would have failed.

5. Power factor: 0.90 or better.

6. Design ambient temperature: 35 °C (95 °F); note that this is the ambient temperature surrounding the luminaire, not the LED or driver heat-sink temperature.

7. EMI/RFI: Meet FCC 47 CFR Part 15.

8. Minimum dimming provisions or capability:

a. 0-10V dimming down to 1%.

B. For emergency battery packs shall be factory installed, unless noted otherwise.

C. Provide NRTL-listed luminaire disconnect assembly for each driver. Manufacturer: IDEAL “PowerPlug”, Thomas & Betts “Sta-Con.”

2.4 LUMINAIRE ACCESSORIES

A. Provide stud supports, mounting brackets, frames, plaster rings and other accessories required for luminaire installation.

B. Furnish hangers as specified below and as required by conditions of installation:

1. Stem hangers shall be made of 1/2-inch steel tubing with 45 degrees swivel ball hanger fitting and ceiling canopy. Finish the same as the luminaire.

2. Rod hangers shall be made of 1/4 inch threaded zinc-plated steel rod.

3. For Highbay LED fixtures provide, power cord and locking type plug. Provide a safety chain or cable for each luminaire that will attach to the building structure, and to the reflector/diffuser assembly.

C. Use NRTL-listed T-bar safety clips for lay-in luminaires.

D. Where indicated on the Drawings or where lamp breakage is detrimental, such as above food counters, provide open fluorescent luminaires with:

1. Self-locking sockets or lamp retainers, two per lamp, and

2. Clear polycarbonate protective lamp sleeves with end caps over each lamp. Sleeve shall have a light transmission of 95 percent and shall be rated for the thermal profile of the lamp and ballast.

2.5 EMERGENCY LIGHTING & EXIT SIGNS

A. Emergency LED driver

1. Battery packs shall be factory installed in fixtures whenever possible.

2. Non Factory installed battery packs shall be as follows:

a. NRTL-listed, self-diagnostic, fully automatic, battery pack in each luminaire indicated on the Drawings.

b. maintenance-free, sealed high-temperature nickel-cadmium or nickel-metal hydride battery with an expected service life of not less than 7 years.

c. Upon interruption of normal AC power, the internal controller shall automatically switch the emergency lighting load to the battery. The battery shall supply the driver with power to produce 1100 to 1400 lumens of emergency light output for a minimum of 90 minutes.

d. Shall have an LED charging indicator lamp and a push to test switch for installation on the luminaire at locations and positions that will be visible from the floor and operable without removing or opening luminaire lenses or covers.

e. Manufacturer: Bodine, IOTA, or approved equal.

B. LED Emergency Exit Sign

1. Furnish a NRTL-listed, self-diagnostic, fully automatic, LED illuminated emergency exit sign at each location indicated on the Drawings.

2. LED emergency exit sign shall be connectable for operation at either 120 or 277 volts and suitable for indoor dry locations with a temperature range of 32 to 104 degrees F.

3. Shall have stencil face letters, and universal mounting capability with all necessary components for each wall, ceiling, or end mounting application.

4. Shall be single face or double face with field-selectable chevron knockouts as indicated on the Drawings or as required for each location.

5. Shall have a maintenance-free battery, either nickel-cadmium or nickel-metal hydride. Battery shall be field-replaceable and shall have an expected service life of not less than 7 years.

6. Upon interruption of normal AC power, or brownout conditions exceeding a 20% drop from nominal voltage, the internal controller shall automatically switch the emergency exit sign lighting load to the battery. Emergency power will be provided for a minimum of 90 minutes. During emergency operation, the battery shall be protected from deep discharge by a low-voltage battery disconnect circuit.

7. Visibility of exit sign during normal or emergency operation shall be not less than that required in UL 924.

8. Exit sign shall provide exterior visual indication of AC power status, all self-diagnostic test cycles, and unit malfunctions including:

a. Battery fault

b. Charger fault

2.6 EXTERIOR LIGHTING

A. Finishes

1. Furnish luminaires, poles, and accessories with finishes as scheduled that are resistant to fading, chalking, and other changes due to aging and exposure to heat and ultraviolet light. Acceptable finishes for metals are:

a. Hot-dipped galvanized steel: ASTM A 123/A 123M.

b. Brushed natural aluminum

c. Anodized aluminum: AAMA 611, Anodized Architectural Aluminum, Class I.

d. Powder coated aluminum: Fluorocarbon polymer powder coating per AAMA 2605, Superior Performing Organic Coatings over chrome phosphate conversion coated aluminum.

e. Powder coated steel: Fluorocarbon polymer powder coating per AAMA 2605, Superior Performing Organic Coatings over zinc phosphate conversion coated shot-blasted steel.

2. Reject luminaires, poles, and accessories with finish having runs, streaks, stains, holidays and defects.

3. Replace luminaires, poles, and accessories showing evidence of yellowing, fading, chalking, and other changes indicating failure during warranty period.

4. Use stainless steel for exposed hardware.

B. Exterior Luminaires - General

1. Furnish exterior luminaires that comply with requirements specified in this Section and in the luminaire schedule on the Drawings.

2. Luminaires shall be NRTL-listed as conforming to UL 1598 - Luminaires.

3. Luminaire housing shall be primarily metal.

a. Metal parts shall be free from burrs and sharp corners and edges.

b. Sheet metal components shall be fabricated from corrosion-resistant aluminum, formed and supported to prevent sagging and warping.

c. Exposed fasteners: Stainless steel.

4. Doors and frames shall be smooth operating and free from light leakage under operating conditions.

a. Doors, frames, lenses and diffusers shall be designed to prevent accidental falling during and when secured in the operating position.

b. Door: Removable for cleaning or replacing lens.

5. Provide lenses, diffusers, covers and globes as scheduled on the Drawings fabricated from materials that are UV stabilized to be resistant to yellowing and other changes due to aging or exposure to heat and ultraviolet radiation.

6. Doors shall have resilient gaskets that are heat-resistant and aging-resistant to seal and cushion lens and refractor.

C. LED Luminaires

1. Conform to UL 1598 and to UL 8250 – Safety Standard for Light-Emitting Diode (LED) Light Sources for Use in Lighting Products.

2. Lead and mercury free.

3. Photometric characteristics: Established using IESNA LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurement of Solid-State Lighting Products.

4. Ingress protection for optical assembly: IP65 or better in accordance with ANSI/IEC 60529 - Degrees of Protection Provided by Enclosures.

5. Color characteristics as follows in accordance with ANSI C78.377 – Specifications for the Chromaticity of Solid State Lighting Products:

   a. Color temperature (deg K): 4000

   b. Color rendering index: not less than 70

6. LED and driver cooling system: Passive and shall resist the buildup of debris.

7. LED luminaire output after 50,000 hours of operation: Not less than 70 percent of the initial lumen output when determined in accordance with IESNA LM-80-08 – IESNA approved Method for Measuring Lumen Maintenance of LED Lighting Sources.

8. LED luminaire electrical characteristics:

   a. Supply voltage: 120 V, 208 V, 240 V, 277 V, or 480 V as indicated on the Drawings. Provide step-down transformers if required to match driver input voltage rating.

   b. Total harmonic distortion (current): Not more than 20 percent

   c. Power factor: Not less than 90%

   d. RF interference: Meet FCC 47 CFR Part 15/18

   e. Driver input surge protection device: UL 1449 3rd Edition recognized component meeting IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits, Category C, High Exposure.

D. Poles and Accessories

1. Furnish poles and accessories that comply with requirements specified in this Section and the luminaire schedule on the Drawings.

2. Pole, base, and anchorage shall carry the luminaires, supports, and appurtenances at the indicated height above grade without deflection or whipping.

3. Mountings, fastenings and other appurtenances shall be fabricated from corrosion-resistant materials that are compatible with poles and luminaires and will not cause galvanic action at contact points. Mountings shall correctly position luminaires to provide scheduled light distribution.

4. A reinforced access handhole, minimum 2.5 x 5 inches, shall be located in the wall of each metal pole.

5. A welded 1/2-inch grounding lug shall be accessible through the handhole of each metal pole. Grounding connection shall be designed to prevent electrolysis when used with copper ground wire.

6. Metal poles shall have anchor type bases and galvanized steel anchor bolts, leveling nuts and bolt covers.

7. Where poles are indicated as “breakaway” type on the Drawings, each pole shall have a frangible aluminum transformer base that meets the requirements of AASHTO LTS-5.

8. Each non-breakaway metal pole shall have a metal base cover that covers the entire base plate and anchorage.

9. Protect painted, anodized, or brushed pole finishes during shipment and installation. Minimum protection shall consist of spirally wrapping each pole shaft with protective paper secured with tape, and shipping small parts in boxes.

10. Steel poles shall be fabricated from tubing having minimum 7-gage steel with minimum yield/strength of 48,000 psi.

    a. Poles shall be anchor bolt mounted type.

    b. Poles shall be one-piece construction up to 40 feet in length. Poles over 40 feet in length may be in two or more sections with overlapping joints.

    c. Poles shall be tapered, either round in cross section or polygonal. Poles shall have a continuous taper not less than 0.14 inch of diameter per foot of length.

    d. Poles shall be welded construction with no bolts, rivets, or other means of fastening except as specifically approved.

    e. Tops of shafts shall be fitted with a round or tapered cover.

    f. Pole markings shall be approximately 3 to 4 feet above grade and shall include manufacturer, year of manufacture, top and bottom diameters, and length.

    g. Provide poles with finish color indicated on the Drawings and conforming to FINISHES article of this Section. If pole is not galvanized, coat inside of pole with suitable rust-inhibiting finish.

h. Base covers for steel poles shall be structural-quality, hot-rolled carbon-steel plate having a minimum yield of 36,000 psi. Finish shall be the same as the corresponding poles.

E. Lighting Control Equipment

1. Furnish lighting control relay panel with astronomical timeclock to control exterior lighting unless indicated otherwise on Drawings.

a. Lighting Control Relay Panel shall be: Acuity Brands BlueBox LT Series with required # of relay's or pre-approved equal.

b. Program on/off times of exterior lighting as directed by Owner.

2. Where photoelectric relays are mounted on luminaires use products that conform to UL 733, Plug-in, Locking Type Photocontrols for Use with Area Lighting with single-pole single-throw contacts arranged to fail in the "ON" position. For each luminaire provide a luminaire-mounted locking-type receptacle conforming to IEEE C136.10.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, spaces, and surfaces to receive exterior luminaire (s) or poles for compliance with installation tolerances and other conditions affecting performance of the product. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Interior Lighting

1. Install interior lighting system in accordance with the NEC, manufacturer's installation instructions, approved shop drawings, and the following NECA National Electrical Installation Standards:

a. NECA/IESNA 500, Recommended Practice for Installing Indoor Commercial Lighting Systems (ANSI)

2. Have the manufacturer's installation instructions available at the Project site.

3. Mounting heights specified or indicated on the Drawings are to the bottom of the luminaire for ceiling-mounted fixtures and to the center of the luminaire for wall-mounted fixtures.

4. Where the ceiling forms the protective membrane of a fire-resistive assembly, install protective coverings over luminaires in accordance with NRTL requirements.

5. Install slack safety wires as described below for luminaires in or on suspended ceilings.

a. Wire shall be minimum 12 gauge galvanized soft annealed steel wire conforming to ASTM A641.

b. Attach wire to the building structure directly above the attachment point on the box or luminaire; make trapezes of framing channel material as required to span obstacles

c. Secure wire(s) at each end with not less than three tight turns in 1-1/2 inches.

6. Install emergency luminaires in suspended ceilings as follows:

a. Fasten the four corners of each luminaire to the suspended ceiling main channels or framing members.

b. Use sheet metal screws or bolts to fasten luminaires above exit pathways.

c. Use NRTL listed clips, sheet metal screws, or bolts or to fasten luminaires that are not above exit pathways.

d. Install two independent slack safety wires per luminaire with dimensions not exceeding 2 ft x 4 ft. Install four independent slack safety wires per luminaire with dimensions exceeding 2 ft x 4 ft. Attach wires to the luminaire not more than 6 inches from the luminaire corners.

7. Support pendant-mounted or cable-supported luminaires directly from the structure above using a 9 gauge wire or an approved alternate support without using the ceiling suspension system for direct support.

a. Install seismic restraints for pendant-mounted and cable-supported luminaires.

b. Pendants, rods, cables, or chains 4 ft or longer shall be braced to prevent swaying using three cables at 120 degrees separation.

8. Connect luminaires in suspended ceilings using 6 ft. lengths of flexible wiring method arranged accommodate not lea than 4 inches of differential seismic movement in any direction. Refer to Section 26 0533 - Raceways and Boxes for Electrical Systems.

B. Emergency Lighting & Exit Signs

1. Install emergency lighting system in accordance with the NEC, NECA/IESNA 500, Recommended Practice for Installing Indoor Commercial Lighting Systems (ANSI), the manufacturer's instructions, and approved shop drawings. Have the manufacturer’s installation instructions available at the construction site.

2. Mount exit signs and unit emergency lights with bottom of fixture not less than 6'-8" or more than 12'-0" above finished floor.

3. Connect each emergency power system outlet box using a minimum 2 ft length of flexible wiring method to accommodate not less than 4 inches

of differential seismic movement in any direction between the outlet box and the non-flexible raceway system. Refer to Section 26 0533 - Raceways and Boxes for Electrical Systems.

4. Install slack safety wires as described below for emergency luminaires and exit signs on suspended ceilings.

   a. Wire shall be minimum 12 gage galvanized soft annealed steel wire conforming to ASTM A641.

   b. Attach wire to the building structure directly above the attachment point on the box or luminaire; make trapezes of framing channel material as required to span obstacles

   c. Secure wire(s) at each end with not less than three tight turns in 1-1/2 inches.

   d. Use connection devices at the supporting structure, outlet box, and luminaire that are capable of carrying not less than 100 pounds.

5. Install branch circuits for emergency lighting and exit signs in accordance with Article 700 of the National Electrical Code.

6. Connect unit emergency lighting equipment to a branch circuit that serves the general lighting in the area and ahead of any local or remote switches.

C. Exterior Lighting

1. Install products in accordance with manufacturer's instructions, NECA/IESNA 501, and approved shop drawings.

2. Locations of luminaires and poles shown on the Drawings are diagrammatic. Coordinate luminaire locations with building finishes, building structure, paving and striping, utility piping, security fences, and existing trees.

3. Set poles and luminaires plumb, square, level and secure.

4. Install surface mounted luminaires directly to an outlet box which is supported from structure.

5. Install lamps in luminaires in accordance with manufacturer's instructions.

3.3 CONCRETE FOUNDATIONS

A. Construct concrete foundations with exterior 4000 psi concrete and reinforcing conforming to Section 03 3001, Reinforced Concrete.

B. Comply with details on the Drawings and manufacturer's recommendations for foundation dimensions, reinforcing, anchor bolts, nuts and washers.

C. Position power conduits and ground rod to terminate within the pole shaft area and one inch above the top of the foundation; refer to Section 26 0533, Raceways and Boxes for Electrical Systems.

D. Cure concrete foundations for 7 full curing days before erecting poles.

3.4 POLE ERECTION

A. Do not install poles without luminaires.

B. Use fabric web slings to raise and set poles.

C. Use leveling nuts or shims to make poles plumb. When leveling nuts are used, set the lower nuts not more than 1 inch from the concrete foundation.

D. Tighten anchor bolt nuts and other pole hardware to torque recommended by manufacturer.

E. After pole is leveled, pack non-shrink grout between anchor base and concrete foundation to provide a full bearing surface. Use a short piece of 1/2-inch diameter pipe to make a drain hole through grout; arrange to drain condensation from interior of pole.

F. Set embedded poles to depth indicated on the Drawings, but not less than 1/6 of pole length below finish grade.

1. Auger holes large enough to permit the use of tampers the full depth of the hole.

2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of the undisturbed earth.

3.5 GROUNDING

A. Install grounding for exterior lighting using materials and methods specified in Section 26 0526, Grounding and Bonding for Electrical Systems.

B. Connect ground lug of metal pole to ground rod using a 6 AWG copper conductor.

C. Connect ground lug of metal pole to circuit equipment grounding conductor.

3.6 FIELD QUALITY CONTROL

A. Make electrical connections, clean interiors and exteriors of luminaires, install lamps, energize and test luminaires, inspect interior lighting system, and deliver spare parts in accordance with manufacturer's instructions and the following NECA National Electrical Installation Standards:

1. NECA/IESNA 500, *Recommended Practice for Installing Indoor Commercial Lighting Systems* (ANSI)

B. Test electronic dimming drivers for full range dimming capability.

1. Check for visually detectable flicker over the full dimming range.

C. Provide factory certified programming and commissioning of the Lighting control systems, occupancy sensors and Daylight sensors.

D. Aim lamps on wall-mounted emergency lighting units to obtain the following illumination of exit pathway:

1. 1 ft-candle average

2. 0.1 ft-candle minimum

3. Maximum-to-minimum uniformity ratio not exceeding 40 to 1.

E. Test emergency lighting equipment in accordance with the manufacturer’s instructions and NECA/IESNA 500.

F. Inspect each installed lighting unit for damage. Replace damaged luminaires, poles, and components.

G. Test installed luminaires for proper operation.

1. Replace or repair malfunctioning luminaires and components then re-test.

2. Repeat procedure until all luminaires operate properly.

H. Replace inoperative fixtures.

3.7 ADJUSTING AND CLEANING

A. Clean each luminaire inside and out, including plastics and glassware. Use methods and materials recommended by manufacturer.

B. Aim adjustable luminaires to provide required light intensities as indicated on the Drawings.

END OF SECTION

SECTION 26 6100 - AUXILIARY SYSTEMS

PART 1 - GENERAL

A. The Auxiliary Systems of this specification are sections that have numbers between 26 6100 – 26 6900. This specification will include the Auxiliary Sections that are relative to this project.

B. Each system mentioned herein is a complete system. Each network is a new system, an extension of an existing and/or a new system that incorporates an existing system into the new. Whatever the condition, the contractor shall provide all the equipment, materials, labor, etc. for a complete and operable network. Each system is specified to perform a definite function. The function and operation of a system is the final objective and whatever the requirement to accomplish that objective shall be included. If for any reason the specifications do not complete the network, the bidder and/or manufacturers representative shall call the deficiencies to the attention of the engineer by facsimile five (5) days prior to the bid date, so they can be included in the addendum. Failure to submit this information to the attention of the engineer does not relieve the bidder from supplying and installing the equipment needed for a complete and operable system.

C. Walk through the system when the project is complete and each auxiliary system has been tested and ready to be set into operation, the contractor, the owner's and manufacturer's representative shall test each component of each system for normal operation and report in writing to the architect and engineer that the system meets all the conditions and functions of the specifications for normal operation.
   1. Example: In the case of the Fire Detection and Alarm System, the people mentioned above plus the local Fire Marshall (or his representative) shall check out the Fire Alarm System. Each component (break glass station, heat detector, ionization detector, alarms, etc.) shall be tested individually to prove their function in the total system. Any and all defective components shall be repaired and/or replaced.
   2. Likewise each of the other auxiliary systems, one by one (sound, F.A., telephone, computer, etc.) shall be tested and written reports made on the results of the test.

D. Return visits: Six months after the system has been accepted by the owner, the factory representative shall return to the project and check-out the system to determine the condition of operation, answer any questions of the operator and/or administrator, make repairs, etc., to determine if the system is operating to its full potential.

E. The factory representative shall review with the operator and administrator on their use of the equipment making sure the equipment is used to the ultimate.

F. Each auxiliary system shall carry a one year warranty from the date of acceptance by the owner.

END OF SECTION

SECTION 266210 – DATA SYSTEM CABLING

PART 1 - GENERAL

1.1 See drawings for additional system requirements.

1.2 Basis of design is Ortronics, the following are approved alternate manufacturers:
a. Hubbell
b. Leviton

1.3 The following specification and its associated drawings are intended to provide a set of instructions and materials needed to furnish and install Telecommunications Cabling, within parameters set by industry standards.

A. The information is modular in nature.
1. Each facility will have one or more of each module discussed.
2. Specifically included in this specification are cables, connecting hardware requirements to provide a Category 6A compliant link to each data port of the workstations.

B. Some of the information contained in the following is directed to the owner's architects, electrical, mechanical, and structural engineers. This information points toward ideal conditions and may vary by site depending on actual conditions.

1.4 CODES AND STANDARDS COMPLIANCE

A. All materials shall comply with the applicable sections of the following Codes for installation of telecommunications cabling:
1. International Building Code (IBC)
2. National Electrical Code (NEC/NFPA 70)
3. National Electrical Safety Code (NESC IEEE C 2)
4. Local Codes, amendments, and ordinances.

B. All materials and installation practices shall comply with the applicable sections of the following Telecommunications Industry Standards:
1. ANSI/TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
2. ANSI/TIA/EIA-568-C.2, Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
3. ANSI/TIA/EIA-568-C.3, Commercial Building Telecommunications Cabling Standard, Part 3: Optical Fiber Cabling Components Standard.
4. ANSI/TIA/EIA-569-A-2001 (Including 5 addendums), Commercial Building Standards for Telecommunications Pathways and Spaces
5. ANSI/EIA/TIA-570-1991, Residential and Light Commercial Telecommunications Wiring Standard
6. ANSI/TIA/EIA-606-1993, The Administration Standard for the Telecommunications infrastructure of Commercial Building
7. ANSI/TIA/EIA-607-1994, Commercial Building Grounding and Bonding Requirements for Telecommunications

C. Installers shall have read the above documents and shall be familiar with the requirements that pertain to this installation. The documents may be obtained from:
1. Global Engineering Documents, 15 Inverness Way East, Englewood, CO, 80112-5776, 800-854-7179, fax: 303-397-2740, http://global.his.com/
2. IEEE-Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY, 10017-2394, 800-678-IEEE, fax: 732-981-9667, http://standards.ieee.org/

D. This document does not replace any Code, local or otherwise. The contractor must be aware of local Codes that may impact this project.

1. The Telecommunications Contractor shall be an approved Ortronics CIP(Certified Installer Plus) OR approved Hubbell Premise Wiring CI (Certified Installer).
2. A copy of the certification documents shall be submitted with the quote.

3. The owner reserves the right to require the Contractor to remove from the project any such employee the Owner deems to be incompetent, careless or insubordinate.
4. All clean up activity related to work performed will be the responsibility of the Low Voltage Contractor and must be completed daily before leaving the site.

E. Pre-Installation Conference:
1. Schedule a conference a minimum of five calendar days prior to beginning work of this Section. Attendees should include Owner's Rep., Engineer, GC, EC and Cabling Sub.
2. Agenda: Clarify questions related to work to be performed, scheduling, coordination, etc.
3. Minutes of the meeting shall be kept by the EC and sent to all attendees.

F. Warranty
1. A 15 Year Product 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. Warranty shall be vendor supplied. Contractor warranty alone is unacceptable
2. The project must be pre-registered with Manufacturer before installation has begun.

PART 2 - PRODUCTS

2.1 COMMUNICATIONS EQUIPMENT ROOMS

A. Equipment Racks:
1. Supply and install all patch panels, rack mounting kits for switches and hubs, wire management components, and patch cables for each equipment rack.
2. Provide quantity of racks as needed to accomplish described scope of work:

MDF (ROOM ###)			
RACKS			
QTY	**DESCRIPTION**	**MFG**	**PART#**
1	19" X 7' Floor Mounted Racks	Ortronics	OR-MM6706
ACCESSORIES			
1	20A Vertical Power Strip	Ortronics	OR-MMCPB12018-01
4	Vertical Wire Management	Ortronics	OR-MM6VMD710
*	2U Dual-hinged, horizontal wire management	Ortronics	OR-MM6HM62RU

* Provide and install a unit above, between and below each installed each patch panel.

IDF ROOMS (TYPICAL OF ALL)			
RACKS			
QTY	**DESCRIPTION**	**MFG**	**PART#**
1	19" X 7' Floor Mounted Racks	Ortronics	OR-MM6706
ACCESSORIES			
1	20A Vertical Power Strip	Ortronics	OR-MMCPB12018-01
3	Vertical Wire Management	Ortronics	OR-MM6VMD710
*	2U Dual-hinged, horizontal wire management	Ortronics	OR-MM6HM62RU

* Provide and install a unit above, between and below each installed each patch panel.

2.2 HORIZONTAL CABLING REQUIREMENTS

A. Copper Cabling

2.3 HORIZONTAL UTP CABLE

A. Cable Solution: CAT 6A

B. Approved Manufacturer(s):
   1. Superior Essex
   2. Mohawk Cable

C. Confirm and provide CMP (Plenum rated) or CMR (Riser) type cable where applicable.

D. Install cables as indicated on the drawings and terminate on patch panels that are rated the same as the cable solution indicated above.

E. Cables shall be labeled on both ends.

2.4 PATCH CORDS:

A. For every new cable and data jack installed, the contractor shall supply the owner with (1) patch cord 50% 3ft. 50% 5ft. Color of patch cords shall be determined by the Owner.

2.5 PATCH PANELS

A. Provide and install angled 110-Style, 48-Port patch panels, quantity as required with 20% spare capacity.

B. Provide patch panels rated the same as the Cable solution specified.

C. All patch panels shall be labeled depicting location.

RATING	MFG	PART #
CAT 5e	Ortronics	OR-PHA5E6U48
CAT 6	Ortronics	OR-PHA66U48
CAT 6A	Ortronics	OR-PHA6AU48

2.6 COAXIAL CABLE

A. Cable Type: RG6 cable. 75 Ohm.

B. Cablesshall be terminated on a Multimedia patch panels. Terminate cable on both ends using F-Type Connectors. See drawings.

1. Multimedia Patch Panels:
   a) Ortronics P/N OR-PHAPJU48
2. F-Type Connectors:
   a) ICM digital P/N 574794
   b) Hubbell P/N SFFWX

2.7 TELECOMMUNICATIONS OUTLET JACKS AND FACEPLATES

A. Telecommunication Jacks (*Jack color shall match cable color):

1. Provide jacks rated the same as the cable solution specified above.

RATING	MFG	PART #
CAT 5e	Ortronics	OR-TJ5E00
CAT 6	Ortronics	OR-TJ600
CAT 6A	Ortronics	OR-TJ6A

B. Telecommunications Faceplates:

1. Material & Color: To match electrical wiring devices
2. Face Plates shall be provided with ID Windows and labeled depicting location.
3. Provide minimum of 6-port faceplates and install blank inserts as needed.
4. Faceplates shall be compatible with Telecommunications jacks.

2.8 FIBER OPTIC CABLING AND EQUIPMENT

A. Cabling requirements:

1. Backbone Cabling
   a) OS1Single-mode
2. Provide and terminate all fiber optic cabling on patch panels utilizing SC type connectors.

B. Patch Panels & Adapter Plates:

1. Provide and install patch panels and adapter plates as required for termination of all cables, provide +20% spare capacity. Provide all required accessories for a complete installation and functional system.

2. Provide a 3 meter, fiber patch cables, 1 per termination
   a) 9/125 Single-mode, Duplex (riser), connectors to match cabling above.

3. Patch Panels (Quantity and Size as required for terminations):
   a) Ortronics: OptiMo FC Series

4. Adapter Plates (Quantity and Size as required for terminations):
   a) Ortronics
   b) Hubbell
   c) Leviton

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS:

A. Provide and install floor mounted racks as described above. Leave adequate slack cable to allow proper operation and maintenance in the racks.

B. EC shall ground all trays, ladder racks and equipment racks to local ground bar, per TIA/EIA 607.

C. Provide and install 18" wide ladder tray up wall from service entrance conduits, around and then over the top of the equipment racks to the cable tray entrance point for cable management. Provide and install "waterfall" components where cables exit tray.

D. Equipment shall be installed in accordance with attached drawings.

E. Horizontal workstation and vertical riser cable termination, order of termination, color coding, grouping, numbering, and labeling shall be performed in accordance with Owner's conventions.

F. All horizontal cable shall be installed using either cable trays, conduit or J-hooks. All cable supports shall be in place prior to cable installation.

G. Cables shall never be pulled or installed directly across suspended ceiling tiles or fluorescent lights.

H. Maximum spacing between "J" hooks shall not exceed four feet. All cable supports shall be in place prior to cable installation.

I. Tie wraps/electrical tape shall not be used to bundle the cables, velcro straps will be used instead.

J. At no time should pulling tension exceed 24 lbs. on horizontal or vertical cables.

K. No intra-building telecommunications cable shall be run adjacent and parallel to power cabling.

L. A minimum of 12 inches distance is required from any fluorescent lighting fixture or power line over 2 kVA and 24 inches from any power line over 5 kVA. Similarly cable should be routed and terminated as far as possible from sources of EMF, such as generators, motors, etc.

M. Install cable supports at the top of each vertical run using cable support Kellum grips or equal support system.

N. Cables shall never be anchored or supported by staples.

3.2 LABELING: (Coordinate all labeling and labeling schemes with Owner, Prior to any labeling).

A. Hand written labels are not acceptable.

B. MDFs will use an M as its designator. The IDF's will use I# (I1,I2,I3) as specified by Owner.

C. Patch panels in the rack will be labeled "A" for the top most panel and "B" for the second.

D. Cable labels shall be Laser printed on Brady type labeler.

E. The cable name will consist of the distribution frame, patch panel and port number that the cable connects to: ie M-A24, I2-B48

F. All cables shall be labeled at each end with the cable name, type, and manufacturer: ie M-A06 (6+-SPSX), I3-B34 (6+-SPSX).

G. The labels will be placed 4 to 6 inches from the cable end and visible in the data jack box.

H. Data jack face plates shall be laser printed on Brady type labels.

I. All data jack face plates shall be labeled with the cable name: ie M-A06.

J. Each optical fiber cable segment shall be labeled at each end with the IDF number that it is supporting with an A for the first cable and a B for the second etc. ie I3-A

K. Each fiber interconnect device shall be labeled with its respective IDF identifier.

L. Each copper backbone cable shall be labeled at each end with its respective IDF number with an A for the first cable and a B for the second. ie I3-A, I3-B

3.3 GENERAL UTP CABLE INSTALLATION:

A. Where UTP cable enters an MDF or IDF it shall be affixed to the ladder try where applicable. All cable shall be neatly bundled, combed, and tied. All cable runs, within the MDF or IDF, shall be horizontal or vertical, and bends shall comply with minimum specified cable bending radii, as dictated by applicable industry standards.

B. Horizontal UTP cable installation, from the IDF to the work area, shall be installed in accordance with EIA/TIA-568-C specified installation practices, manufacturer specified installation practices, terminated to T 568-B. The entire work station cable system, including wiring blocks, cable, and telecommunications outlets shall be tested for the Category of cable specified compliance.
   1. All UTP cable supports shall be installed prior to cable installation.
   2. All UTP cables shall be routed parallel with the building structures. Cables shall not route diagonally across a concealed space.

3.4 TESTING:

A. UTP CABLES AND LINKS
   1. All UTP cabling will be certified to meet and or exceed the specifications as set forth in TIA/EIA-568-C.1using a level IV field tester. Certifications shall include the following parameters for each pair of each cable installed:
      a) Wire map (pin to pin connectivity)
      b) Length (in feet)
      c) Attenuation
      d) Near End Crosstalk (NEXT)
      e) PSNEXT
      f) Far End Crosstalk (FEXT)
      g) ELFEXT (ACRF)
      h) PSELFEXT (PSACRF)
      i) Return Loss
      j) Propagation Delay
      k) Delay Skew

B. OPTICAL FIBER CABLES
   1. After terminating optical fiber cables the system shall be tested using Tier 1 test format. Tier 1 testing is mandatory. Tier 2 testing, (OTDR testing), is optional.
   2. Single modeoptical fiber attenuation shall be tested on all individual fibers of each cable segment with a nCompass approved certification tester (DTX-1800 with DTX-EFM2 Modules) using a LED light source. Test set up and performance shall be in accordance with ANSI/TIA-526-14-B. To fully comply with ANSI/TIA-526-14-B, use of a controlled launch or “Encircled Flux” is REQUIRED. Test results should include

location identification, link attenuation loss, link length and polarity. These tests shall be performed at the 850nm and 1300nm windows in both directions

C. Test results will be handed over at the end of the project and shall provide an electronic and printed record of these tests

D. Owner reserves the right to hire an independent testing company to spot check the test results. If the results vary more than 10% from the results provided by the Contractor, the Contractor will be required to prove his results are correct or retest the entire system.

3.5 TEST RESULTS ACCEPTANCE:

A. Documentation:
   1. Contractor shall provide documentation that will include test results and as-built drawings.

B. Test Results:
   1. All test results will be supplied to the Owner in an Electronic and printed format. Each individual test result will fit on a single 8.5 X 11 inch sheet of paper. All test results will be compiled and bound in a neat and logical manner. All Electronic test results will also be supplied to the Owner in electronic format.

C. As-Built Drawings:
   1. Contractor will be provided with electronic copies of the drawings depicting the data communications system. Contractor shall modify the electronic drawing to produce a new drawing(s) depicting the following information: data outlet locations as they were installed and labeled, actual cable routing, innerduct locations and number, conduit locations and numbers, and Cable TV routing and numbering. The As-Built electronic drawings shall then be provided to the Owner in an AUTOCAD version 2018 or higher format.

3.6 TRANSFER OF OWNERSHIP

A. Final acceptance and payment of the data communications system, by Owner, shall be based upon receipt of the following items:
   1. Results of Testing:
      a) All UTP data cables must meet the criteria established in 3.1.
   2. Receipt of Documentation:
      a) All documentation shall be submitted to the District, before final acceptance is declared. Refer to Section 3.2.A.
   3. Walk Through:
      a) A site inspection or “Walk Through” will be conducted. Representatives from the Owner and the Vendor are to be present. The site will be inspected to ensure that the wiring has been installed to the specification outline in this document.

END OF SECTION

SECTION 31 1010
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Removal of surface debris.
B. Removal of trees, shrubs, and other plants .

1.02 RELATED SECTIONS
A. Section 02310 - Grading: Topsoil removal.
B. Section 02318 - Rock Removal.

1.03 PROJECT CONDITIONS
A. Protect rock features designated to remain as final landscaping.
B. Protect bench marks and survey control points from damage or displacement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION
A. Tag existing site areas and rock feature designated to remain.
B. Identify a salvage area for placing removed materials.

3.02 CLEARING
A. Clear areas required for access to site and execution of Work.
B. Remove trees, shrubs, and stumps brush & debris except areas to be undisturbed within marked areas.
C. Clear undergrowth and deadwood without disturbing subsoil.

3.03 REMOVAL
A. Remove debris from site.

END OF SECTION

SECTION 31 2200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for site structures.

C. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 31 2316 - Excavation.

B. Section 31 2323 - Fill: Filling and compaction.

C. Section 32 9300 - Plants: Topsoil in beds and pits.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements relating to unit prices for this work.

B. Topsoil: Applies to Unit Price _____.
   1. Measurement Method: By the cubic foot.
   2. Includes: Excavating existing topsoil, stockpiling, scarifying substrate surface, placing where required, compacting, and dewatering.

1.04 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil - Soil Type ____: Topsoil excavated on-site.
   1. Graded.
   2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.

B. Other Fill Materials: See Section 31 2323.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. See Section 31 2323 for filling procedures.

G. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

H. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

I. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

A. Stockpile excavated topsoil on site.

B. Stockpile excavated subsoil on site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

E. Place topsoil in areas where seeding are indicated.

F. Place topsoil where required to level finish grade.

G. Place topsoil to the following compacted thicknesses:
   1. Areas to be Seeded with Grass: 6 inches.
   2. Areas to be Sodded: 4 inches.
   3. Shrub Beds: 18 inches.
   4. Flower Beds: 12 inches.
   5. Planter Boxes: To within 3 inches of box rim.

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and foreign material while spreading.

J. Near plants spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

L. Lightly compact placed topsoil.

M. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.07 FIELD QUALITY CONTROL

A. See Section 31 2323 for compaction density testing.

3.08 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Review existing site conditions. The Owner has accomplished some considerable site cleanup and preparation. Contractor shall be required to proceed from the site condition on May 30, 2011.

B. Refer to and review engineers "Top of Grade Elevations" drawing after owner accomplished site preparations are complete (prior to bid) to determine depth of fill required under this contract.

C. Excavating for building volume below grade, footings, slabs-on-grade, and site structures.

1.02 RELATED REQUIREMENTS

A. Document: Soil & Foundation Report by X-Cell Engineering : Geotechnical report; test hole locations and findings of subsurface materials.

B. Section 01572 - Construction Site Discharge: Slope protection and erosion control.

C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.

D. Section 31 2200 - Grading: Grading.

E. Section 31 2316.26 - Rock Removal: Removal of rock during excavating.

F. Section 31 2323 - Fill: Fill materials, backfilling, and compacting.

G. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect bench marks, survey control points, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for topsoil removal.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by JHS Architects.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Notify JHS Architects of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. See Section 31 2316.26 for removal of larger material.

H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

I. Provide temporary means and methods, as required, to remove all water from excavations until directed by JHS Architects. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

J. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the JHS Architects. If the proposed excavation extends more than 1 foot into the excavation, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by the Geotechnical Engineer.

K. Remove excavated material that is unsuitable for re-use from site.

L. Stockpile excavated material to be re-used in area designated on site 31 2200.

M. Remove excess excavated material from site.

N. Stockpile any excess material at location designated by City of Pocatello.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by JHS Architects before placement of foundations.

3.05 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

SECTION 31 2316.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

B. See Civil Engineering drawings for definition of work accomplished, pre bid, by the Owner.

1.02 RELATED REQUIREMENTS

A. Document Soils Report by Xcell Engineering: Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 01572 - Construction Site Discharge: Slope protection and erosion control.

C. Section 31 2200 - Grading: Site grading.

D. Section 31 2316 - Excavation: Building and foundation excavating.

E. Section 31 2323 - Fill: Backfilling at building and foundations.

1.03 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

D. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

I. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

J. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Pipe Invert Elevations: Indicated on drawing.

C. Subgrade Elevations: Finish grade less base course, pavements and / or topsoils.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

D. Protect bench marks and survey control points from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type Silt Soil: Conforming to City of Pocatello Public Works Department standard.

B. Structural Fill: Conforming to City of Pocatello Public Works Department standard.

C. Concrete for Fill: Lean concrete.

D. Pipe Bedding Material
   1. Sand - Fill Type ____: Conforming to State of _____ _____ standard.
      a. Sand - Fill Type ____: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

E. Topsoil: See Section 31 2200.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. If tests indicate materials do not meet specified requirements, change material and retest.

C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Identify required lines, levels, contours, and datum locations.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the JHS Architects.

3.03 TRENCHING

A. Notify JHS Architects of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excavated material that is unsuitable for re-use from site.

G. Stockpile excavated material to be re-used in area designated in Section 31 2200.

H. Remove excess excavated material from site. Remove to City or Pocatello designated stockpile area.

I. Provide temporary means and methods, as required, to remove all water from trenching until directed by the JHS Architects. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

J. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the JHS Architects.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with 2 inch minus Pit Run.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Bottom of trenches shall be accurately graded to the lines and grade shown on the drawings. Bedding material shall provide uniform bearing and support along the entire length of pipe.

D. Bell holes and depressions for joints shall be dug after the trench bedding has been graded, and shall be only of such length, depth and width as required for properly making the particular type joint.

E. Where rock is encountered in the trench excavation work, it shall be excavated to a depth of 6 inches below bottom of pipe and shall be backfilled with bedding material as specified, thoroughly compacted to 95% and graded to proper elevation and grade.

F. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BEDDING AND FILL

A. At Water & Sewer & Storm Drain Piping:
   1. Bedding: Use Fill Type per CIty of Pocatello Standards.
   2. Cover with Fill Type per CIty of Pocatello Standards.
   3. Fill up to subgrade elevation.
   4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

3.06 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Compaction Density Unless Otherwise Specified or Indicated:
   1. Refer to Geotechnical Report by Excell Engineering.

I. Reshape and re-compact fills subjected to vehicular traffic.

3.07 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.08 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests: Refer to City of Pocatello Standards.

3.09 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 31 2316.26
ROCK REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of discovered rock during excavation.

1.02 RELATED REQUIREMENTS

A. Section 02310 - Grading: Pad Preparation.

B. Section 02315 - Excavation: Removal and handling of soil to be removed.

C. Section 02316 - Fill and Backfill: Fill materials.

D. Section 02317 - Trenching For Site Utilities.

1.03 PAYMENT TERMS:

A. If encountered, rock excavation will be paid for in accordance with contract conditions for changes to the work and the following:

1. Site Rock Removal: By the cubic foot measured before removal. Includes preparation of rock for removal, explosive disintegration of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.
   a. Under pavement areas, 4" below bottom of pavement section. Pavement section includes ashalt and sub-base material.
   b. Under slabs on grade, 6" below bottom of concrete slab.
2. Trench Rock Removal: By the cubic foot measured before removal. Includes preparation of rock for removal, explosive disintegration of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.
   a. Two feet outside of concrete work for which forms are required, except footings.
   b. One foot outside perimeter of footings.
   c. In pipe trenches, 6" below invert elevation of pipe and 2 ft. wider than inside diameter of pipe, but not less than 3 ft. minimum trench width.

1.04 DEFINITIONS

A. Site Rock: Solid mineral material with a volume in excess of 1/3 cubic yard or solid material that cannot be removed with a 3/4 cubic yard capacity power shovel without drilling.

B. Trench Rock: Solid mineral material with a volume in excess of 1/6 cubic yard or solid material that cannot be removed with a one cubic yard capacity power shovel without drilling.

C. Rock: Solid mineral material of a size that cannot be removed with a one cubic yard capacity power shovel.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.02 ROCK REMOVAL

A. Excavate and remove rock by mechanical methods only; use of explosives is prohibited.

B. Mechanical Methods: Drill holes and utilize expansive tools to fracture rock.

C. If rock is uncovered requiring the explosives method for rock disintegration, notify JHS Architects.

D. Form level bearing at bottom of excavations.

E. Remove shaled layers to provide sound and unshattered base for footings.

F. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

G. Remove excavated materials from site.

H. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 31 2323.

3.03 FIELD QUALITY CONTROL

A. Independent agency field inspection will be provided under provisions of Section 01 4000 - Quality Requirements.

END OF SECTION

SECTION 31 2323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Review existing site conditions. The Owner has accomplished some considerable site cleanup and preparation. Contractor shall be required to proceed from the site condition on May 30, 2011.

B. Refer to and review engineers "Top of Grade Elevations" drawing after owner accomplished site preparations are complete (prior to bid) to determine depth of fill required under this contract.

C. Filling, backfilling, and compacting for building volume below grade, footings, paving, and site structures.

1.02 RELATED REQUIREMENTS

A. Document: Soil & Foundation Report by X-Cell Engineering : Geotechnical report; test hole locations and findings of subsurface materials.

B. Section 01572 - Construction Site Discharge: Slope protection and erosion control.

C. Section 31 2200 - Grading: Removal and handling of soil to be re-used.

D. Section 31 2200 - Grading: Site grading.

E. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.

F. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

D. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

1.05 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

D. Compaction Density Test Reports.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type silt soil: Subsoil excavated on-site.
   1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Structural Fill - Fill Type Granular: Conforming to City of {Pocatello Public Works Department standard.

C. Concrete for Fill: Lean concrete.

D. Sand - Fill Type : Conforming to City of Pocatello Public Works Department standard.

E. Topsoil: See Section 31 2200.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. If tests indicate materials do not meet specified requirements, change material and retest.

C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. See Section 31 2200 for additional requirements.

D. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

E. Verify structural ability of unsupported walls to support imposed loads by the fill.

F. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

G. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inchs to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with 6 inch minus Pit run.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

F. Soil Fill: Place and compact material in equal continuous layers not exceeding 12 inches compacted depth.

G. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise on the Site Grading Plan. Make gradual grade changes. Blend slope into level areas.

H. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density per ASTM.

I. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under slabs-on-grade and similar construction: 97 percent of maximum dry density per ASTM.
   2. At Parking Areas : 95 percent of maximum dry density.
   3. At other locations: 95 percent of maximum dry density.

J. Reshape and re-compact fills subjected to vehicular traffic.

K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the JHS Architects. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Structural Fill at Building Pads:
   1. Use structural fill.
   2. Fill up to subgrade elevations.
   3. Maximum depth per lift: 12 inches, compacted.
   4. Compact to minimum 97 percent of maximum dry density.

C. Under Interior Slabs-On-Grade:
   1. Use granular fill - 6 inch minus Pit Run.
   2. Depth: 6 inches deep.
   3. Compact to 95 percent of maximum dry density.

D. At Foundation Walls and Footings:
   1. Use Structural Fill.
   2. Fill up to subgrade elevation.
   3. Compact each lift to 95 percent of maximum dry density.
   4. Do not backfill against unsupported foundation walls.
   5. Simultaneously on each side of unsupported foundation walls until supports are in place.

E. At Lawn Areas:
   1. Use general fill.
   2. Fill up to 4 inches below finish grade elevations.
   3. Compact to 95 percent of maximum dry density.
   4. See Section 31 2200 for topsoil placement.

F. At Planting Areas Other Than Lawns :
   1. Use general fill.
   2. Fill up to 12 inches below finish grade elevations.
   3. Compact to 95 percent of maximum dry density.

4. See Section 31 2200 for topsoil placement.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1.2 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: per City of Pocatello Standards.

F. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

3.07 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Leave unused materials in a neat, compact stockpile.

C. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

D. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 32 1313
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, stair steps, integral curbs, gutters, and parking areas.

1.02 RELATED REQUIREMENTS

A. Document: Soil & Foundation Report by X-Cell Engineering : Geotechnical report; test hole locations and findings of subsurface materials.

B. Section 01572 - Construction Site Discharge: Slope protection and erosion control.

C. Section 03 1000 - Concrete Forming and Accessories.

D. Section 03 2000 - Concrete Reinforcing.

E. Section 03 3000 - CAST-IN-PLACE CONCRETE.

F. Section 31 2200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.

G. Section 31 2323 - Fill: Compacted subbase for paving.

H. Section 32 1216 - Asphalt Paving: Asphalt wearing course.

I. Section 07 9005 - Joint Sealers: Sealant for joints.

J. Section 09 9000 - Painting and Coating: Pavement markings.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

C. ACI 305R - Hot Weather Concreting; 2010.

D. ACI 306R - Cold Weather Concreting; 2010.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

J. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

K. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

L. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

O. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

P. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

Q. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

R. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

C. Samples: Submit two sample panels, 12 by 12 inch in size illustrating exposed aggregate finish.

D. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain cementitious materials from same source throughout.

C. Conform to ACI 305R when concreting during hot weather.

D. Conform to ACI 306R when concreting during cold weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of City of Pocatello Standards Division 700, Concrete.

B. Parking Area Pavement: 4,000 psi 28 day concrete, 5 inches thick, 6 by 6 - W2.9 by W2.9 mesh reinforcement, wood float finish.

2.02 FORM MATERIALS

A. Form Materials: As specified in Section 03 1000, conform to ACI 301.

B. Joint Filler: ASTM D 1751 type; 1/2 inch thick. Provide Conflex manufactured by Masonite. or Equal.

2.03 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 80 (80,000 psi) yield strength; deformed billet steel bars; unfinished.

B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

C. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Concrete Materials: Provide in accordance with City of Pocatello Standards, Division 700.

C. Exposed Aggregate: Quartz washed natural mineral aggregate, ____ inch minimum and ____ inch maximum size, _____ color, from a single source.

D. Air-Entraining Admixtures: ASTM C260/C260M.

2.05 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Properties: City of Pocatello - "City Mix".

1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; _____ psi.
2. Fly Ash Class F Content: Maximum 15 percent of cementitious materials by weight.
3. Cement Content: Minimum 611 lb per cubic yard.
4. Water-Cement Ratio: Maximum 45 percent by weight.
5. Total Air Content: 6.5 percent (+/- 1%), per ASTM C 173.
6. Maximum Slump: 3 inches.
7. Maximum Aggregate Size: 3/4 inch.

2.06 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted granular base is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. Prepare subbase in accordance with Municipality of Pocatello Public Works standards.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

C. Notify JHS Architects minimum 24 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement as indicated and/or per City of Pocatello Specs.

B. Interrupt reinforcement at contraction joints.

C. Place dowels to achieve pavement and curb alignment as detailed.

D. Provide doweled joints 18 inch on center at with one end of dowel set in capped sleeve to allow longitudinal movement.

3.06 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

A. Place concrete in accordance with City of Pocatello Standards of Division 700 Public Works standards.

B. Do not place concrete when base surface is wet.

C. Place concrete using the slip form technique.

D. Ensure reinforcement, inserts, embedded parts, formed joints and ____ are not disturbed during concrete placement.

E. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

3.08 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Provide scored joints.
   1. At 6 feet intervals or as shown.
   2. Between sidewalks and curbs.
   3. Between curbs and pavement.

C. Provide keyed joints as indicated.

D. Saw cut contraction joints 1/4 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.09 EXPOSED AGGREGATE

A. Sand blast concrete surfaces to achieve aggregate exposure of ____ percent of unit aggregate surface to match sample panel.

3.10 FINISHING

A. Area Paving: Light broom, texture perpendicular to pavement direction.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

C. Curbs and Gutters: Light broom, texture parallel to pavement direction.

D. Direction of Texturing: Transverse to pavement direction.

E. Inclined Vehicular Ramps: Broomed perpendicular to slope.

F. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.11 JOINT SEALING

A. See Section 07 9005 for joint sealer requirements.

3.12 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

3.13 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.
   2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
   3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.14 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit vehicular traffic over pavement for 7 days minimum after finishing.

END OF SECTION

SECTION 32 1613
CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Construct curb and combined curb and gutter of Portland cement concrete as shown on the drawings.

1.02 QUALITY ASSURANCE:

A. Standards:

B. ACI 301 "Specifications for Structural Concrete for Buildings;"

C. ACI 306 "Cold Weather Concreting;"

D. ACI 305 "Hot Weather Concreting;"

E. ACI 211 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete;"

F. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete:" American Concrete Institute (ACI).

1.03 SUBMITTALS

A. Certificates: Batch certificates for each load of ready-mix delivered to the job site, certifying that batch conforms to approved proportions.

B. Proposed proportions for mix concrete, including results of tests performed to establish mix designs.

C. Current test results to establish suitability of current aggregate source.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:
   1. Portland Cement: ASTM C-150, Type II
   2. Aggregates: ASTM C-33
   3. Water: Potable

B. Admixtures
   1. Air Entrainment: ASTM C-260
   2. Chemical Admixtures: ASTM C-494

C. Joint Former: Nonstaining PVC plastic, to be removed without spilling concrete.

D. Curing Materials
   1. Impervious Sheet Covering: Polyethylene sheeting - Commercial Standard CS-238, four-mil minimum thickness, black; polyethylene-coated kraft paper; waterproof paper - ASTM C-144.
   2. Liquid Membrane Curing Compound; ASTM C-309, Type 1. Provide one of the following: Esco's Tri-Kote No. 18, West chemical's Fil-Por, Hilyard's Cem Seal; use fugitive dye type.

2.02 CONCRETE MIX

Ready Mix Concrete: ASTM C-94,

1. Strength: 3,000 psi, compressive strength at 28 days.
2. Aggregate Size: 3/4-inch maximum.
3. Proportions: ACI 211.

Minimum Cement Content: Concrete shall contain at least the quantity of cement shown on the following table.

Compressive Strength At 28 Days	Minimum Sack of Cement Per Cubic Yard
3000 psi	5.5

Consistency: **Slump** shall be within the range indicated below.

Minimum	2 inches
Maximum	4 inches
Entrained Air:	4% to 6%

PART 3 - EXECUTION

3.01 HAND-FORMED CURB

A. Forms shall be either metal or straight-grained finished lumber. They shall be straight, free of warp or irregularities, and of sufficient strength to resist springing or departure from true alignment and grade. Forms shall be full depth, securely staked, and braced with headers and clamps. Contact surfaces of forms shall be clean and oiled to prevent adherence of materials and damage during form removal.

B. The base and forms shall be thoroughly moist but not muddy, soft, or showing pools of water when the concrete is placed. Concrete shall be placed in the forms in uniform layers not to exceed 6 inch loose depth. Each layer shall be thoroughly consolidated to assure uniform, maximum density, and a smooth surface next to the forms.

C. As soon as concrete has set sufficiently to retain its shape, forms shall be removed and honeycombed or rough surfaces shall be immediately corrected by use of 1:2 mortar. The concrete shall be floated with a wooden float to remove form marks and other irregularities.

3.02 FINISHING

A. Concrete shall be worked until the coarse aggregate is exposed. The surface shall then be floated with a wooden float to a smooth and uniform surface. When the concrete in the curb and gutter has hardened sufficiently, the surface shall be given a broom finish. The strokes shall be square across the curb and gutter from edge, with adjacent strokes overlapped. Strokes shall be made without tearing the concrete. The broomed finish shall produce regular corrugations not over 1/8-inch in depth.

3.03 CURING

A. Any of the following curing methods may be used. Surfaces to receive coatings shall be water cured if liquid curing compound is incompatible.
   1. Moist Curing: Cover with burlap, mats or 1-inch sand. Completely cover surface, lap sheet materials 3 inches. Thoroughly saturate cover with water and keep wet.

2. Impervious Sheet Curing: Thoroughly wet surfaces with a fine water spray. Completely cover surfaces with waterproof paper. Lap all edges 4 inches or more and seal with adhesive or tape. Weight to prevent displacement. Repair or replace if damaged.
3. Liquid Membrane Curing Compound: Apply per manufacturer's instruction.

3.04 JOINTING

A. Contraction joints shall be provided at 10-foot intervals. Where shorter sections are necessary for closure, the interval may be less than 10 feet, but no section shall be less than 7 feet. The depth of the contraction joints shall be 3/4 of an inch.

B. Where hand-formed curbs are used, form a cold joint through the curb section at 10-foot intervals. Tool edges of cold joints before concrete hardens.

END OF SECTION

SECTION 32 8423
UNDERGROUND SPRINKLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. ASTM D 2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

B. Pipe and fittings, valves, sprinkler heads, emitters, bubblers, and accessories.

C. Control system.

1.02 REFERENCE STANDARDS

A. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

B. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.

C. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

D. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings; 2004 (Reapproved 2011).

E. ASTM D 2466 - Standare Specification for Poly Vinyl Chloride (PVC) Pressure - Rated Pipe.

F. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this Section.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Operation and Maintenance Data:
   1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
   2. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for piping and component requirements.

1.06 PRE-INSTALLATION MEETING

A. Convene one week prior to commencing work of this Section.

1.07 COORDINATION

A. Coordinate the work with site backfilling, landscape grading and delivery of plant life.

PART 2 PRODUCTS

2.01 IRRIGATION SYSTEM

A. Manufacturers:
   1. Irritrol - Controllers ISU Standard
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PIPE MATERIALS

A. PVC Pipe: ASTM D 2466 Schedule 40 PVC.

B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A); annealed temper.

C. Fittings: Type and style of connection to match pipe.

D. Pipe Risers at Valves: As shown on Drawings.

E. Solvent Cement: ASTM D2564 for PVC pipe and fittings.

F. Solder and Flux: ASTM B32 solder, with suitable flux.

G. Sleeve Material: PVC.

2.03 OUTLETS

A. Spray Type Sprinkler Head: Pop-Up head with full circle pattern or other pattern as shown on Drawings.

B. Quick Coupler: As Shown..

2.04 VALVES

A. Ball Valves: Bronze construction non-rising stem.

B. Backflow Preventers: Bronze body construction, double check valve type.

C. Valve Box and Cover: _____.

2.05 CONTROLS

A. Controller: Sizes as shown on Drwgs.

B. Wire Conductors: Color coded, direct burial, 14 gage, & single strand.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of existing utilities.

B. Verify that required utilities are available, in proper location, and ready for use.

3.02 PREPARATION

A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.

B. Layout and stake locations of system components.

C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.03 TRENCHING

A. Trench Size:
   1. Minimum Width: 3 inches.
   2. Minimum Cover Over Installed Supply Piping: 18 inches.
   3. Minimum Cover Over Installed Branch Piping: 12 inches.

B. Trench to accommodate grade changes and slope to drains.

C. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.04 INSTALLATION

A. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions.

B. Install pipe and wires under walks, driveways or parking area in sleeves buried 18 inches minimum below finish grade.

C. Connect to utilities as shown on drawings.

D. Set outlets and box covers one inch above finish grade.

E. Provide for thermal movement of components in system.

F. Install control wiring in accordance fwith Manufacturers recomendations. Use waterproof wire connectors, 3M DBY. Provide 10 inch expansion coil at each valve to which controls are connected, and at 100 ft intervals. Bury wiring beside pipe.

G. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

3.05 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 4000 - Quality Requirements.

B. Prior to backfilling, test system for leakage at main piping to maintain 100 psi pressure for one hour.

C. System is acceptable if no leakage or loss of pressure occurs and system self drains during test period.

3.06 BACKFILLING

A. Provide 2 inch sand or rock free soil surrounding piping.

B. Backfill trench and compact to specified subgrade elevation. Protect piping from displacement.

3.07 SYSTEM STARTUP

A. Prepare and start system in accordance with manufacturer's instructions.

B. Adjust control system to achieve time cycles required.

C. Adjust head types for full water coverage as directed.

3.08 CLOSEOUT ACTIVITIES

A. Instruct the Owner's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance data as basis for demonstration.

END OF SECTION

SECTION 32 9300
PLANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. New trees, plants, and ground cover.

B. Mulch and Fertilizer.

C. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Topsoil material.

1.03 REFERENCE STANDARDS

A. ANSI/AHIA Z60.1 - American National Standard for Nursery Stock; 2014.

1.04 DEFINITIONS

A. Weeds: Any plant life not specified or scheduled.

B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

1.05 REGULATORY REQUIREMENTS

A. Plant Materials: Certified by federal department of agriculture; free of disease or hazardous insects.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Protect and maintain plant life until planted.

C. Deliver plant life materials immediately prior to placement. Keep plants moist.

1.07 FIELD CONDITIONS

A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

B. Do not install plant life when wind velocity exceeds 40 mph.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide one year warranty.

C. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.

D. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

A. Maintain plant life for three months after Date of Substantial Completion.

B. Maintenance to include:

1. Irrigating sufficient to saturate root system.
2. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
3. Maintaining wrapping, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.
4. Replacement of mulch.

PART 2 PRODUCTS

2.01 PLANTS

A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

B. Trees: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

2.02 SOIL MATERIALS

A. Topsoil: Type as specified in Section 31 2200.

2.03 MULCH MATERIALS

A. Fiber Mulch: Shredded douglas fir bark.

2.04 ACCESSORIES

A. Fertilizer Tablet: Agriform 21 gram.

B. Wrapping Materials: Burlap.

C. Stakes: Softwood lumber, pointed end.

D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.

E. Decorative Cover: " Fiber Mulch " Shredded douglas fir bark.

F. Rodent Protective Wrap: Arbor Gard.

2.05 TOP SOIL MIX

A. A uniform mixture of 1 part "Soil Dep"as available from Mt. West Bark and 4 parts topsoil by volume.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared subsoil are ready to receive work.

B. Saturate soil with water to test drainage.

C. Verify that required underground utilities are available, in proper location, and ready for use.

3.02 PREPARATION OF SUBSOIL

A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

D. Dig pits and beds 6 inches larger than plant root system.

3.03 FERTILIZING

A. Add Fertilizer Tablet in plant pit 3" below surface as follows: Five Gallon Plant ---- Three Tablets One Gallon Plant ---- One Tablet Tree ---- Six Tablets.

3.04 PLANTING

A. Place plants as indicated for approval by JHS Architects.

B. Set plants vertical.

C. Remove non-biodegradable root containers.

D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth as indicated on drawings under each plant. Remove top third of burlap, ropes, and wires, from the root ball.

E. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.05 INSTALLATION OF ACCESSORIES

A. Place decorative cover, where indicated on drawings.

B. Wrap deciduous shade and flowering tree trunks and place 9 inch long section of rodent protective wrap.

3.06 PLANT SUPPORT

A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:
   1. Tree Caliper: 1 to 2 inches; Tree Support Method: 2 stakes with two ties

3.07 FIELD QUALITY CONTROL

A. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.08 MAINTENANCE

A. Provide maintenance at no extra cost to the Owner; the Owner will pay for water.

B. Irrigate sufficiently to saturate root system and prevent soil from drying out.

C. Remove dead or broken branches and treat pruned areas or other wounds.

D. Neatly trim plants where necessary.

E. Immediately remove clippings after trimming.

F. Water to prevent soil from drying out.

G. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.

H. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.

I. Remedy damage from use of herbicides and pesticides.

J. Replace mulch when deteriorated.

K. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

END OF SECTION

SECTION 33 1416
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water pipe for site conveyance lines.

B. Pipe valves.

C. Fire hydrants.

D. Review existing site conditions. The Owner has accomplished some considerable site preparation work including main water lines. Contractor will be required to proceed from the site condition existing on May 30, 2011.

E. Pipe and fittings for site water lines including domestic water lines, fire water lines, and water service lines.

F. Valves and Fire hydrants.

G. Disinfection of piping systems.

H. Concrete Thrust Blocks or Restraints.

1.02 RELATED REQUIREMENTS

A. Document: Soil & Foundation Report by X-Cell Engineering : Geotechnical report; test hole locations and findings of subsurface materials.

B. Section 01572 - Construction Site Discharge: Slope protection and erosion control.

C. Section 03 3000 - CAST-IN-PLACE CONCRETE: Concrete for thrust restraints.

D. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

A. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; 2013.

B. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.

C. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2009.

D. AWWA C502 - Dry-Barrel Fire Hydrants; 2014.

E. AWWA C504 - Rubber-Seated Butterfly Valves 3 In. (75 mm) Through 72 In. (1,800 mm); 2010.

F. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; 2011.

G. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2009.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 WATER DISTRIBUTION - NOT IN CONTRACT (NIC)

A. Pipe and fittings for water lines including domestic water lines, fire water lines, fire hydrants and water service lines will be installed by the City of Pocatello Water Department.

B. Water piping work will be completed prior to Notice to Proceed for this contract.

1.06 QUALITY ASSURANCE

A. Work Performed by and in accordance with City of Pocatello requirements will not be the responsibility of this contractor in any regard except:
   1. Make Connection at 5 feet out from the building, and
   2. Protect from damage all new water distribution work including that installed by the Owner.

PART 2 PRODUCTS

2.01 (NOT USED)

2.02 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03 3000.

B. Backflow Preventer: as required by City of Pocatello standards.

C. Disinfectant as required by the City of Pocatello.
   1. Provide a water / chlorine solution.

PART 3 EXECUTION

3.01 (NOT USED)

END OF SECTION

SECTION 33 3113
SANITARY SEWER PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.
   1. Main Line and Manholes to existing sewer system.
   2. Branch Lines to within 15 feet average of building. Include wye, stub & cap for plumbing contractor.

B. Connection of building sanitary drainage system to City of Pocatello Municipal Service.

C. Manholes.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - CAST-IN-PLACE CONCRETE: Concrete for cleanout base pad construction.

B. Document: Soil & Foundation Report by X-Cell Engineering : Geotechnical report; test hole locations and findings of subsurface materials.

C. Section 01572 - Construction Site Discharge: Slope protection and erosion control.

D. Section 31 2316 - Excavation: Excavating of trenches.

E. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

F. Section 31 2323 - Fill: Bedding and backfilling.

G. Section 03 3000 - Cast-in-Place Concrete: Concrete for cleanout base pad construction.

1.03 REFERENCE STANDARDS

A. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.

B. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines; 2014.

C. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2015.

D. ASTM C14M - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric); 2015.

E. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2015.

F. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric); 2014.

G. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2012.

H. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric); 2011.

I. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.

J. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated; 2013.

K. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

L. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.

M. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2001 (Reapproved 2014).

N. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

O. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2015.

P. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2012.

1.04 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe and pipe accessories .

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Project Record Documents:
   1. Record location of pipe runs, connections, catch basins,, manholes, and invert elevations.
   2. Identify and describe discovery of uncharted underground utilities.
   3. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 PROJECT CONDITIONS

A. Coordinate the Work with termination of sanitary sewer connection outside building, connection to City of Pocatello sewer utility service, and trenching.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Provide products that comply with City of Pocatello Standard as Revised, Section 501.

B. Cast Iron Soil Pipe: ASTM A74, service type, inside nominal diameter of ____ inches, hub and spigot end.

C. Concrete Pipe: Nonreinforced, ASTM C14 or ASTM C14M, Class 1; inside nominal diameter of ____ inches, bell and spigot end joints.

D. Joint Seals for Concrete Pipe: ASTM C443 (ASTM C443M) rubber compression gaskets.

E. Concrete Pipe: Reinforced, ASTM C76 (ASTM C76M), Class II with Wall type A; mesh reinforcement; inside nominal diameter of ____ inches, bell and spigot end joints.

F. Plastic Pipe: ASTM D2680 Acrylonitrile-Butadiene-Styrene (ABS) material; inside nominal diameter of ____ inches, bell and spigot style solvent sealed joint end.

G. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 PIPE ACCESSORIES

A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

D. Casing Spacer: Polyethylene spacer designed to maintain pipe casing integrity.
   1. Manufacturers:
      a. Advance Products & Systems, LLC: www.apsonline.com/#sle.

2.03 MANHOLES & CLEANOUT COMPONENTS

A. Provide products that comply with Pocatello Standard Revsion, Section 502.

B. Lid and Frame: Cast iron construction, hinged lid.
   1. Nominal Lid and Frame Size: 26 inches.

C. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female dry joints, cast steel ladder rungs into shaft sections at 12 inches; nominal shaft diameter of 36 inches.

D. Manhole Sections: Reinforced precast concrete in accordance with ASTM C 478 with gaskets in accordance with ASTM C 923.
   1. Concrete: As Specified in Section 03300.
   2. Manufacturers: Precast Units by Amcor, Pocatello Precast or approved equal.
   3. Shaft Construction: Concentric with concentric cone top section; lipped male/female dry joints; sleeved to receive pipe sections.
   4. Size: Nominal shaft diameter of 48 inches or as shown otherwise.

E. Lid and Frame: ASTM A 48, Class 30B Cast iron construction, machined flat bearing surface, removable lockable lid, closed lid dewign. Nominal Lid and Frame: 24 inches.

F. Base Pad: Cast-in-place concrete of type specified in Section 03 3000, levelled top surface to receive concrete shaft sections, sleeved to receive sanitary sewer pipe sections.

2.04 BEDDING AND COVER MATERIALS

A. Pipe Bedding Material: As specified in Section 31 2316.13.

B. Pipe Cover Material: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 GENERAL

A. Perform work in accordance with City of Pocatello Standard, Revision Division 500 and applicable codes.

3.02 TRENCHING

A. See Section 31 2316.13 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
   1. Clay Pipe: Also comply with ASTM C12.
   2. Plastic Pipe: Also comply with ASTM D2321.

C. Install pipe, fittings, and accessories in accordance with ASTM D 2321 and manufacturer's instructions. Seal joints watertight.

D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
   1. Solvent cement joint pipe and fittings, joining with solvent cement in accordance with ASTM D 2855 and ASTM F 402.
   2. Use commercially manufactured wye fittings for piping branch connections.

E. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated. Set cleanout frame and cover in concrete block, 18 x 18 x 12 inches deep. Set top of cleanout at 1 1/2 inches above surrounding finish grade or flush with grade when install in paving.

F. Connect to municipal sewer system .

G. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.

3.04 INSTALLATION - MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.
   1. Provide a minimum of three (3) 4 inch grade ring below each lid assembly.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. If Work does not meet requirements, remove Work, replace & retest at no cost to the Owner.

C. Pressure Test: Test in accordance with _____.

D. Infiltration Test: Test in accordance with _____.

E. Deflection Test: Test in accordance with _____.

3.06 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION