City of Woonsocket

Water Division's New Garage & Offices, Roy Ave.

BID No. 6161

Bid Specifications

Prepared By: City of Woonsocket

Water Department

August 2023

CITY OF WOONSOCKET, RHODE ISLAND

INVITATION TO BID FOR:
"WATER DIVISION'S NEW GARAGE & OFFICES, ROY AVE."
BID 6161

Sealed bids must be received, and date/time stamped by the City of Woonsocket, in the Finance Department, **Office of Purchasing**, City Hall, 169 Main Street, Woonsocket, Rhode Island no later than **2:00pm** on ***Thursday, September 7, 2023***. Then, at the aforementioned date and time, on-time bids will be publicly opened in the **2nd Floor Conference room**, City Hall, 169 Main Street, Woonsocket, Rhode Island.

Bids are for the construction of a one story structure of approximately 6,906 s.f. Structure to be pre-manufactured metal building for offices and garage. Price shall include site work, ISDS system, private well, foundations, metal building, finishes, electrical, plumbing and fire alarm work as described in the drawings prepared by Ed Wojcik Architect, Ltd.

A pre-bid site visit is scheduled for 10:00 am on Thursday, August 17th, 2023 at Roy Avenue,Woonsocket, RI.

ALL BIDS MUST BE SUBMITTED IN DUPLICATE COPY IN A SEALED ENVELOPE PLAINLY MARKED ON THE OUTSIDE "WATER DIVISION'S NEW GARAGE AND OFFICES, ROY AVE., BID #6161."

A certified check or bid bond in the amount of 5% of the bid price must accompany each proposal. The certified checks or bonds will be returned to all but the successful bidder upon execution of the contract. The bidder's check/bond will be returned when the terms of the conditions of the bid are met to the satisfaction of the City of Woonsocket.

Deadline to submit questions is ***Monday, August 28, 2023.*** *Questions should be submitted in writing t Ken Allaire, Woonsocket Purchasing Agent at kaallaire@woonsocketri.org.*

Individuals requesting interpreter services for the hearing impaired should call the Finance Director at 401-762-6400 seventy-two (72) hours in advance of the bid opening.

Unless otherwise specified, the City reserves the right to accept or reject Proposals in whole or in part, and to waive any informalities or irregularities not affecting substantial rights. as may be in the best interest of the City.

No bidder may withdraw its bid within sixty (60) days after the actual time and date of the bid opening thereof.

Published: August 10, 2023

Cindy Johnston
Finance Director

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GENERAL CONTRACT TERMS & PROVISIONS

These General Contract Terms and Provisions, as issued by the Purchasing Department, are standard for all vendors doing business with the City of Woonsocket. These General Contract Terms and Provisions may be deleted or modified at any time, for any reason, as may be in the best interest of the City .

1.0 RECEIPT AND OPENING OF BIDS AND PROPOSALS:

1.1 The City of Woonsocket, acting through its Purchasing Agent (referred to as the "City"), is responsible for the final content and publication of all Requests for Proposal (herein referred to as "RFP" or "RFPs") or Invitations to Bid (herein referred to as "ITB" or "ITBs") on the forms attached hereto for ultimate approval by the City of Woonsocket's Finance Department.

1.2 Sealed RFPs or ITBs must be received, and date stamped by Woonsocket City Hall, 169 Main St., Woonsocket, Rhode Island 02895, up until the time and date indicated in the published Solicitation or Addendum.

1.3 Sealed envelopes must be clearly and plainly marked as indicated in Section 3.2.

1.4 Published RFPs or ITBs do not commit the City to pay any costs incurred by any Bidder in conducting or making the necessary studies or designs for the preparation thereof, or for procuring or contracting for the items to be furnished under an RFP or ITB.

1.5 No RFP or ITB received after the time and date indicated in the published Solicitation or Addendum will be considered.

1.6 At the time of the opening of an RFP or ITB each Bidder will be presumed to have read and to be thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any Bidder to examine any form, instrument or document will in no way relieve any Bidder from an obligation in respect to his RFP or ITB.

2.0 FORM OF RFPS OR ITBS:

2.1 RFPs or ITBs must be submitted on and in accordance with the documents attached hereto, blank places must be filled in as noted, no changes can be made in the phraseology of the documents or in the item or items mentioned therein.

2.2 RFPs or ITBs must be printed in ink or typewritten. All RFPs or ITBs must be prepared in conformity with and must be based upon and submitted subject to all requirements of the specifications together with all addenda thereto.

2.3 Additionally, the RFP or ITB must contain the company's name and proper address. It must be signed by an individual that is duly authorized to sign in the name, and on behalf, of the respective Bidder for the purposes and consideration expressed in the RFP or ITB accompanied by their official title.

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2.4 RFPs or ITBs, which are not complete, or contain any omissions, erasures, alterations, additions or contain irregularities of any kind, may be rejected. FAXED RFPs or ITBs will not be accepted.

2.5 At any time prior to the scheduled RFP or ITB opening, the Bidder may modify his/her RFP or ITB by written communication. A single strike through, in ink, of the modification is required so the item being modified is still clearly legible.

2.6 All modifications must include an explanation or note, the initials of the modifier and the date of the modification.

2.7 If the intent of the Bidder's written communication is not clearly identifiable, the interpretation most advantageous to the City will prevail.

3.0 SUBMITTING AN RFP OR ITB:

3.1 Envelopes containing RFPs or ITBs must be sealed and addressed to Woonsocket City Hall, Office of Purchasing, Attn: Purchasing Agent, 169 Main St., Woonsocket, Rhode Island 02895.

3.2 Sealed RFPs or ITBs must be submitted in duplicate. Each sealed envelope must be clearly and plainly marked on the outside with the name and address of the Bidder, the Bid title, the Bid number and the date and time of the bid opening.

3.3 The Purchasing Agent will decide when the specified date and time has arrived to collect the RFPs or ITBs, and no Bids received thereafter will be considered.

3.4 It is the Bidder's responsibility to verify that the RFP or ITB has been timely received and delivered to the Purchasing Department prior to the Bid opening date and time. The City is not responsible for late receipt of an RFP or ITB, regardless of the reason for the delay. Proof of transmission or of mailing doesn't constitute proof of receipt.

3.5 Any Bidder may withdraw his RFP or ITB by written request at any time prior to the advertised Bid due date. Telephonic or faxed RFPs or ITBs, amendments or withdrawals are not accepted.

3.6 No RFP or ITB may be withdrawn for a period of ninety (90) calendar days from the date and time of published Bid opening date or authorized postponement thereof by addendum. The City reserves the right to waive this requirement to best serve the interests of the City.

3.7 Negligence on the part of the Bidder in preparing the RFP or ITB confers no rights for the withdrawal of their Bid after it has been opened.

3.8 RFPs or ITBs received prior to the time of the due date will be secured and remain unopened.

3.9 No responsibility will attach to an officer or person of the City for the premature opening of an RFP or ITB not properly addressed and identified as such. Any RFP or ITB opened prematurely due to the failure of the Bidder to mark the envelope in accordance with this Section will be considered non-responsive and returned.

3.10 The City may consider informal any RFP or ITB not prepared and submitted in accordance with the provisions hereof and may waive any informalities in or reject any and all RFPs or ITBs.

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4.0 ADDENDA AND INTERPRETATION:

4.1 No interpretation of the meaning of the specifications or other pre-RFP or ITB documents will be made to any Bidder orally. Every request for such interpretation must be made in writing addressed to the Purchasing Agent, City of Woonsocket, 169 Main Street, Woonsocket, Rhode Island 02895, and must be received by the Questions' deadline date and time as noted in the documentation to be given consideration.

4.2 Any and all such interpretations and any supplemental instructions will be in the form of written addenda, which, if issued, will be posted on the City's website, and will become part of the RFP or ITB documents.

4.3 It is the Bidder's responsibility to check and download any and all addenda from the City's Website up to the Bid opening date and time.

4.4 Each Bidder must ascertain, prior to submitting their RFP or ITB, that they have received all Addenda issued and must acknowledge their receipt in his/her Submission.

4.5 No Addenda will be posted later than four(4) working days prior to bid opening date except for an Addendum, if necessary, postponing the opening date or withdrawing the RFP or ITB.

4.6 Any written or oral instructions concerning an RFP or ITB, unless supported by an addendum, regardless of the source of that information, is non-binding, should not be relied upon and is not considered part of the Solicitation.

4.7 In the event there is a discrepancy between verbal communication and written communication, the written communication will govern.

5.0 QUALIFICATIONS OF BIDDER:

5.1 The City may make such investigations as it deems necessary to determine the ability of the Bidder to perform the work, and the Bidder must furnish to the City all such information and data for this purpose as the City may request.

5.2 The City reserves the right to reject any RFP or ITB if the evidence submitted by, or investigation of such Bidder, fails to satisfy the City that such Bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

5.3 One or more of the following conditions will result in the disqualification of a Bidder and rejection of his/her RFP or ITB:

A. Evidence of collusion among Bidders.
B. A material misrepresentation in an RFP or ITB.
C. Bidder's failure to meet the minimum criteria for responsiveness and responsibility.

6.0 CONTRACT SECURITY:

6.1 When a Contract Security is required in the RFP or ITB, the Bidder and sub-Bidders must furnish that bond for the value as outlined in the Solicitation. These may be in the form of a bid bond, cash, certified check, treasurer's, or cashier's check, payable to the City. The security is

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for the faithful performance of the contract and for the payment of all persons performing labor on the project under the contract and furnishing materials, equipment, and all other incidentals in connection with the contract.

6.2 The surety on such bonds must be a duly authorized surety company licensed to bond in the State of Rhode Island, and the cost of same will be paid by the Bidder.

6.3 Before final acceptance, the bonds must be approved by the City. The bonding company providing surety must be listed in the Federal Register as issued by the Department of Treasury, Department Circular 570, latest edition, as well as being licensed in the State of Rhode Island to provide surety.

6.4 Attorneys-in-fact who sign Bid bonds or Contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

6.5 Such bid bonds, cash, certified checks, treasurers, or cashier's checks will be returned to all except the three lowest Bidders within a reasonable time after the opening of Bids. The remaining bid bonds, cash or checks will be returned promptly after the City and the accepted Bidder have executed the contract.

6.6 If no award has been made within ninety (90) days after the date of the opening of the RFP or ITB, upon demand of the Bidder, at any time, thereafter, can request the return of their bond so long as he/she has not been notified of the acceptance of their Proposal.

6.7 No RFP or ITB will be considered for a Contract if Section 6.1 is identified as a requirement and that requirement is either not submitted with the RFP or ITB or the value submitted is not sufficient.

7.0 RFP OR ITB PRICES:

7.1 Bidders must state the proposed price(s) in the manner as designated in the Solicitation.

7.2 The final proposed, extended total price should be stated both in numbers and in written words.

7.3 In the event that there is a discrepancy between the unit prices and the extended totals, the unit prices will govern.

7.4 In the event there is a discrepancy between the price written in words, and the price written in numbers, the price written in words will govern.

8.0 PAYMENT TERMS:

8.1 All Payment Terms with the City are Net 60 (sixty) days.

8.2 Cash Discounts offered will be considered in determining awards. However, discounts for a period less than twenty (20) days will not be considered. The discount period must be computed from date of delivery or from date the correct invoice is received by the City, whichever date is later. The date of delivery must be construed to mean the date on which the RFP or ITB item is determined to meet the specifications and is therefore acceptable.

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9.0 RHODE ISLAND SALES TAX:

9.1 The City of Woonsocket is exempt from the Rhode Island Sales or Use Tax under the 1956 General Laws of the State of Rhode Island, Section 44-18-30, Para. 1, as amended.

10.0 "OR EQUAL" RFP OR ITB:

10.1 When the name of a manufacturer, a brand name or manufacturer's catalogue number is issued as the RFP or ITB standard in describing an item followed by "Or Approved Equal", this description is used to indicate quality, performance and other essential characteristics of the item required.

10.2 If proposing on other than the make, model, brand, or sample specified, but equal thereto, Bidder must so state by giving the manufacturer's name, catalogue number and any other information necessary to prove that his intended substitution of a commodity is equal in all essential respects to the RFP or ITB standard provided.

10.3 Bidder must prove to the satisfaction of the City Department Director, or by person or persons designated by him, that the Bidder's designated substitute is equal to the RFP or ITB standard; otherwise, his RFP or ITB will be rejected.

10.4 The City reserves the right to determine if equipment or materials, which comply substantially in quality and performance with the specifications, are acceptable to the City and if any variance listed by the Bidder in his/her RFP or ITB is material or immaterial.

10.5 It is the intent of the City, if accepting any substitutes, to accept them in the order in which they are listed in the RFP or ITB form. The City has the right to accept substitutes in any order or combination and to determine the lowest Bidder on the basis of the sum of the base RFP or ITB and the substitutes accepted.

11.0 AWARD AND CONTRACT:

11.1 It is the intent of the City, in accordance with state procurement regulations, to award contracts with reasonable promptness. They will be awarded to the responsive and responsible Bidder offering the most advantageous price. Provided that the RFP or ITB was submitted in accordance with the requirements of the Solicitation, is judged to be reasonable and does not exceed the funds available.

11.2 A "responsive Bidder" is a Bidder who has submitted the RFP or ITB, which conforms to all material aspects of the Solicitation.

11.3 The City reserves the right to determine the lowest responsive and responsible Bidder in any way determined to be in the best interests of the City. An award may be based on any or all of the following factors:

A. Adherence to all conditions and requirements of the RFP or ITB specifications.

B. Price.

C. Qualifications of the Bidder, including past performance, financial responsibility, general reputation, experience, service capabilities, and facilities.

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D. Delivery or completion date.

E. Product appearance, workmanship, finish, taste, feel, overall quality, and results of product testing.

F. Maintenance costs and warranty provisions

G. Repurchase or residual value.

11.5 The City reserves the right to consider total cost of ownership factors in the final award recommendation (i.e., transition costs, training costs, etc.).

11.6 The City reserves the right to award by item, part or portion of an item, group of items or total proposal, to reject any and all proposals in whole or in part, if, in the City's judgment, the best interest of the City will be so served.

11.7 The City reserves the right to award multiple, optional use contracts. In addition to the other factors listed, offers will be evaluated on the basis of advantages and disadvantages to the City that may result from making more than one award.

11.8 The successful respondent will receive an award letter. Respondents who are not awarded will receive a notification that the award decision has been made.

12.0 TIME OF COMMENCEMENT/COMPLETION:

12.1 A written award (or acceptance of RFP or ITB) mailed (or otherwise furnished) to the successful Bidder and will be considered accepted by the City seven (7) calendar days following the transmitted or post marked date. The award letter may be followed by a City Purchase Order which will be deemed to result in a binding contract without further action by either party.

12.2 The successful Bidder, upon the notification of the acceptance of his/her RFP or ITB, as defined in Section 12.1, must within ten (10) calendar days execute and deliver the contract and bonds required by the RFP or ITB.

12.3 The successful Bidder must agree to commence work thirty (30) calendar days after RFP or ITB acceptance by the city unless otherwise notified by a Notice to Proceed from the City, written communication by the Department Director or his designee.

12.4 The successful Bidder must agree also to pay as liquidated damages the sum of Five Hundred ($500.00) Dollars for each consecutive calendar day, but no earlier than thirty (30) days after the fixed date for commencement/completion thereafter as determined by Section 12.3.

12.5 Allowances may be made when a Force Majeure event has occurred.

12.5.1 A Force Majeure event may include, but is not limited to the following: (a) acts of God; (b) flood, fire, earthquake or explosion; (c) war, invasion, hostilities (whether war is declared or not), terrorist threats or acts, riot or other civil unrest; (d) government order or law; (e) actions, embargoes or blockades in effect on or after the date of this Agreement; (f) action by any governmental authority; (g) national or regional emergency; (h) strikes, labor stoppages or slowdowns or other industrial disturbances; (i) epidemic, pandemic or similar influenza or bacterial infection (which is

defined by the United States Center for Disease Control as virulent human influenza or infection that may cause global outbreak, or pandemic, or serious illness); (j) emergency state; (k) shortage of adequate medical supplies and equipment; (l) shortage of power or transportation facilities; and (m) other similar events beyond the reasonable control of the Impacted Party.

12.6 After the Offer has been presented to the successful Bidder and the successful Bidder has Accepted that Offer (herein will further be referred to as the "Contractor").

13.0 INSURANCE REQUIREMENTS:

13.1 Contractors must comply with the minimum insurance requirements imposed by the State. If different or additional insurance requirements are set forth in the Solicitation, the Contractor must comply with those requirements.

13.2 If there is a discrepancy between the minimum insurance requirements imposed by the State and the requirements set forth in the Solicitation, the greater insurance coverage requirements will prevail.

13.3 The Contracted party will not commence work under any Contract until they have obtained all required insurance and has been approved by the City.

13.4 All Subcontractors are subject to this Section. It is the responsibility of the Contracting party to confirm that Subcontractors, under their employ for the Contract, have adhered to and in compliance with the requirements set forth in this Section.

13.5 The Contractor and Subcontractor must provide the City's Requesting Department with satisfactory proof of the insurance required. This proof must consist of two (2) certificates from each insurer insuring the Contractor or any Subcontractors under the Contract.

13.6 Each certificate must contain the following information:

A. The name and address of the insured.

B. The policy number.

C. The limits of liability.

D. The expiration date of the policy.

E. A statement that the insurance of the type afforded by the policy applies to all the Contractor's operations on or at the site of the work.

F. A statement which refers to the City Contract and insurance specification and states that such insurance is as required by the Contract.

G. A statement as to exclusions and methods of cancellation.

14.0 CONSIDERATIONS FOR REJECTING RFPs OR ITBs:

14.1 If an area remains unserved due to lack of or rejection of RFPs or ITBs, the City may, within its discretion, select and negotiate with a Bidder already providing service to an area or with an entity qualified to provide service in all or part of the unserved area.

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14.2 Unless otherwise specified, the City reserves the right to accept or reject RFPs or ITBs in whole or in part, and to waive any informalities or irregularities not affecting substantial rights as may be in the best interest of the City.

14.3 The City reserves the right to reject the RFP or ITB of any Bidder who has previously failed to perform properly or complete on time Contracts of a similar nature, who is not able to perform the Contract , has habitually, without just cause, neglected the payment of bills, or disregarded its obligations to sub-contractors, materials, or employees.

14.4 The City reserves the right to reject any or all RFPs or ITBs not accompanied by a requirement set forth in the Solicitation or if the RFP or ITB, in any way, is incomplete or irregular.

15.0 LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:

15.1 Upon failure or refusal to complete the foregoing, Bidder must forfeit to the City, as liquidated damages for such failure or refusal, the security deposited with his/her RFP or ITB.

15.2 The Bidder's forfeiture of security must be a waiver of all rights as a Bidder under the Contract and must relieve the City of all responsibility to said Bidder.

16.0 DELIVERY:

16.1 All RFP or ITB Prices must be based on Incoterms DDP (Delivered Duty Paid) Woonsocket, RI. The Bidder will assume all costs, risks, and obligations, including import duties, taxes, clearance fees etc., if applicable, up to the destination point. At the destination point the loading or unloading the shipment will be set forth in the Contract, otherwise it will be at the discretion of the Department Director.

16.2 Deliverable quantities, dates and times must be met as per the Purchase Order, the Contract or written instructions provided by the Department Director or his designee.

16.3 No delivery will be accepted without written confirmation as outlined in Section 16.2.

17.0 LAWS AND REGULATIONS:

17.1 All applicable federal and state laws, city ordinances (including zoning ordinances) and the rules and regulations of all authorities having jurisdiction applies to all Contracts and they are deemed to be included in all Contracts the same as though herein written out in full.

17.2 In the event of any inconsistencies between the above laws, regulations, or ordinances versus the provisions of the Contract, the laws, regulations or ordinances will prevail.

18.0 EQUAL EMPLOYMENT OPPORTUNITY:

18.1 The City has adopted an **Equal Employment Opportunity Clause**, which is incorporated into all specifications, purchase orders, and contracts, whereby a vendor agrees not to discriminate against any employee or applicant for employment as defined in Section 18.2.

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18.2 For all Contracts for supplies and services exceeding ten thousand dollars ($10,000), Contractors must comply with the requirements of federal executive order no. 11246, as amended, R.I. General Law § 28-5.1-10, and other regulations as issued by the purchasing agent, and administered by the state equal opportunity office of the department of administration.

18.3 By submitting qualifications, proposals or bids, the firm is attesting to the City that they are an Equal Opportunity Employer.

18.4 Non-compliance with the provisions of this Section will be considered a substantial breach of the Contract subject to penalties or remedies invoked as provided by statute or regulation. Including, but not limited to, being declared ineligible for future Contracts or other sanctions.

19.0 OSHA SAFETY AWARENESS PROGRAM:

19.1 In accordance with Rhode Island General Law § 37-23-1 (2018), all Contractors performing work on municipal and state construction projects with a total project cost of one hundred thousand dollars ($100,000) or more, shall have an OSHA "ten (10) hour construction safety program" for their on-site employees. The training program shall utilize instructors trained by the occupational safety and health administration, using an OSHA approved curriculum. Graduates shall receive a card from the U.S. department of labor occupational safety and health administration certifying the successful completion of the training course.

19.2 Every person shall have a card issued by the U.S. department of labor occupational safety and health administration certifying their successful completion of the OSHA ten (10) hour training program, as required by this section, on their person at all times while work is actually being performed on municipal and state construction projects. No person shall transfer their card certifying their successful completion of the OSHA ten (10) hour training program to another person. Failure to comply with this section shall subject the holder to penalties prescribed by the director of the department of labor and training.

SECTION 00 2113
INSTRUCTIONS TO BIDDERS

FORM OF INSTRUCTIONS TO BIDDERS

1.01 THE INSTRUCTIONS IN THIS DOCUMENT AMEND OR SUPPLEMENT THE INSTRUCTIONS TO BIDDERS AND OTHER PROVISIONS OF THE BIDDING AND CONTRACT DOCUMENTS.

1.02 DOCUMENT INCLUDES

A. Invitation
   1. Bid Submission
   2. Intent
   3. Work Identified in Contract Documents
   4. Contract Time

B. Bid Documents and Contract Documents
   1. Contract Documents Identification
   2. Availability
   3. Inquiries/Addenda

C. Site Assessment
   1. Site Examination
   2. Prebid Conference

D. Bid Submission
   1. Submission Procedure

E. Offer Acceptance/Rejection
   1. Duration of Offer

INVITATION

2.01 BID SUBMISSION

A. Sealed bids must be received, and date/time stamped by the City of Woonsocket, in the Finance Department, **Office of Purchasing**, City Hall, 169 Main Street, Woonsocket, Rhode Island no later than **2:00 pm** on **Thursday, September 7, 2023**. Then, at the aforementioned date and time, on-time bids will be publicly opened in the 2nd Floor Conference room, City Hall, 169 Main Street, Woonsocket, RI.

B. **ALL BIDS MUST BE SUBMITTED IN DUPLICATE COPY IN A SEALED ENVELOPE PLAINLY MARKED ON THE OUTSIDE "WATER DIVISION'S NEW GARAGE AND OFFICES, ROY AVE., BID # 6161."**

C. Offers submitted after the above time shall be returned to the bidder unopened.

D. Offers will be opened publicly after the time for receipt of bids.

2.02 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

A. Work of this proposed Contract comprises building construction, including general construction, structural, mechanical, electrical, and site Work.

2.03 CONTRACT TIME

A. Identify Contract Time in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the commencement date.

BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 CONTRACT DOCUMENTS IDENTIFICATION

A. Contract Documents are identified as **Bid Number 6161** and Project Number 4222 , as prepared by Architect who is located at One Richmond Square, Providence, RI 02906, and with contents as identified in the Table of Contents.

3.02 AVAILABILITY

A. Bid documents for the sole purpose of obtaining bids will be made available to General Contract Bidders. General Contract bidders are responsible for forwarding information to

subcontractors and suppliers.

3.03 EXAMINATION

A. Bid Documents may be viewed at the office of Architect which is located at One Richmond Square, Suite 100K, Providence, RI 02906.

B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.

C. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.

3.04 INQUIRIES/ADDENDA

A. Deadline to submit questions is **Monday, August 28, 2023**. Questions should be submitted in writing to Ken Allaire, Woonsocket Purchasing Agent at ken.allaire@woonsocketri.org

B. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.

C. Verbal answers are not binding on any party.

SITE ASSESSMENT

4.01 SITE EXAMINATION

A. Examine the project site before submitting a bid.

4.02 PREBID CONFERENCE

A. A bidders conference has been scheduled for 10:00 a.m. on the 17th day of August 2023 at the location of Roy Avenue, Woonsocket, RI.

B. All general contract bidders and suppliers are invited.

C. Representatives of Architect will be in attendance.

D. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

QUALIFICATIONS

5.01 SUBCONTRACTORS/SUPPLIERS/OTHERS

A. Owner reserves the right to reject a proposed subcontractor for reasonable cause.

BID SUBMISSION

6.01 SUBMISSION PROCEDURE (SEE INVITATION TO BID)

6.02 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.

BID ENCLOSURES/REQUIREMENTS (SEE INVITATION FOR BID)

7.01 CONSENT OF SURETY

7.02 PERFORMANCE ASSURANCE

A. Accepted Bidder: Provide a Performance bond as described in 00 7300 - Supplementary Conditions.

B. Include the cost of performance assurance bonds in the Bid Amount.

7.03 FEES FOR CHANGES IN THE WORK

A. Include in the Bid Form, the overhead and profit fees on own Work and Work by subcontractors, applicable for Changes in the Work, whether additions to or deductions from the Work on which the Bid Amount is based.

B. Include in the Bid Form, the fees proposed for subcontract work for changes (both additions and deductions) in the Work. Contractor shall apply fees as noted, to the subcontractor's gross (net plus fee) costs on additional work.

7.04 BID FORM SIGNATURE

OFFER ACCEPTANCE/REJECTION

8.01 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the bid closing date.

8.02 ACCEPTANCE OF OFFER

A. Owner reserves the right to accept or reject any or all offers.

B. After acceptance by Owner, Architect on behalf of Owner, will issue to the successful bidder, a written Bid Acceptance.

END OF SECTION

"General Decision Number: RI20230001 06/30/2023

Superseded General Decision Number: RI20220001

State: Rhode Island

Construction Types: Building, Heavy (Heavy and Marine) and Highway

Counties: Rhode Island Statewide.

BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories) HEAVY, HIGHWAY AND MARINE CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/06/2023
1	01/13/2023
2	02/03/2023
3	03/17/2023
4	04/14/2023
5	05/12/2023
6	06/02/2023
7	06/16/2023
8	06/30/2023

ASBE0006-006 06/01/2022

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER (Includes preparation, wetting, stripping, removal scrapping, vacuuming, bagging & disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems)	$ 38.30	25.55

ASBE0006-008 09/01/2021

	Rates	Fringes
Asbestos Worker/Insulator Includes application of all insulating materials, protective coverings, coatings & finishes to all types of mechanical systems.	$ 45.00	32.89

BOIL0029-001 01/01/2021

	Rates	Fringes
BOILERMAKER	$ 45.87	29.02

BRRI0003-001 06/01/2022

	Rates	Fringes
Bricklayer, Stonemason, Pointer, Caulker & Cleaner	$ 46.86	29.14

BRRI0003-002 09/01/2022

	Rates	Fringes
Marble Setter, Terrazzo Worker & Tile Setter	$ 46.54	30.34

BRRI0003-003 09/01/2022

	Rates	Fringes
Marble, Tile & Terrazzo Finisher	$ 38.78	29.61

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* CARP0330-001 06/05/2023

	Rates	Fringes
CARPENTER (Includes Soft Floor Layer)	$ 42.78	30.00
Diver Tender	$ 43.78	30.00
DIVER	$ 55.93	30.00
Piledriver	$ 41.53	29.35
WELDER	$ 43.78	30.00

FOOTNOTES:

When not diving or tending the diver, the diver and diver tender shall receive the piledriver rate. Diver tenders shall receive $1.00 per hour above the pile driver rate when tending the diver.

Work on free-standing stacks, concrete silos & public utility electrical power houses, which are over 35 ft. in height when constructed: $.50 per hour additional.

Work on exterior concrete shear wall gang forms, 45 ft. or more above ground elevation or on setback: $.50 per hour additional.

The designated piledriver, known as the ""monkey"": $1.00 per hour additional.

CARP1121-002 01/02/2023

	Rates	Fringes
MILLWRIGHT	$ 41.54	30.73

ELEC0099-002 06/01/2023

	Rates	Fringes
ELECTRICIAN	$ 48.61	50.44%
Teledata System Installer	$ 36.46	11.59%+15.31

FOOTNOTES:

Work of a hazardous nature, or where the work height is 30 ft. or more from the floor, except when working OSHA-approved lifts: 20% per hour additional.

Work in tunnels below ground level in combined sewer outfall: 20% per hour additional.

ELEV0039-001 01/01/2023

	Rates	Fringes
ELEVATOR MECHANIC	$ 59.36	37.335+a+b

FOOTNOTES:

a. PAID HOLIDAYS: New Years Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

b. Employer contributes 8% basic hourly rate for 5 years or more of service of 6% basic hourly rate for 6 months to 5

years of service as vacation pay credit.

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* ENGI0057-001 06/01/2023

	Rates	Fringes
Operating Engineer: (power plants, sewer treatment plants, pumping stations, tunnels, caissons, piers, docks, bridges, wind turbines, subterranean & other marine and heavy construction work)		
GROUP 1	$ 45.55	29.45
GROUP 2	$ 43.55	29.45
GROUP 3	$ 39.17	29.45
GROUP 4	$ 36.32	29.45
GROUP 5	$ 42.60	29.45
GROUP 6	$ 33.40	29.45
GROUP 7	$ 27.40	29.45
GROUP 8	$ 39.25	29.45
GROUP 9	$ 43.17	29.45

a. BOOM LENGTHS, INCLUDING JIBS:

150 feet and over + $ 2.00
180 feet and over + $ 3.00
210 feet and over + $ 4.00
240 feet and over + $ 5.00
270 feet and over + $ 7.00
300 feet and over + $ 8.00
350 feet and over + $ 9.00
400 feet and over + $10.00

a. PAID HOLIDAYS:
New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

a. FOOTNOTES:
Hazmat work: $2.00 per hour additional.
Tunnel/Shaft work: $5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks

GROUP 2: Digging machine, Ross Carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, graders, front end loader (3 yds. and over), vibratory hammer & vacuum truck, roadheaders, forklifts, economobile type equipment, tunnel boring machines, concrete pump and on site concrete plants.

GROUP 3: Oilers on cranes.

GROUP 4: Oiler on crawler backhoe.

GROUP 5: Bulldozer, bobcats, skid steer loader, tractor, scraper, combination loader backhoe, roller, front end

loader (less than 3 yds.), street and mobile-powered sweeper (3-yd. capacity), 8-ft. sweeper minimum 65 HP).

GROUP 6: Well-point installation crew.

GROUP 7: Utility Engineers and Signal Persons

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator and light plant, gas and electric driven pump and air compressor.

GROUP 9: Boat & tug operator.

ENGI0057-002 05/01/2022

	Rates	Fringes
Power Equipment Operator (highway construction projects; water and sewerline projects which are incidental to highway construction projects; and bridge projects that do not span water)		
GROUP 1	$ 36.70	29.25+a
GROUP 2	$ 31.40	29.25+a
GROUP 3	$ 25.40	29.25+a
GROUP 4	$ 31.98	29.25+a
GROUP 5	$ 35.68	29.25+a
GROUP 6	$ 35.30	29.25+a
GROUP 7	$ 30.95	29.25+a
GROUP 8	$ 32.33	29.25+a
GROUP 9	$ 34.28	29.25+a

a. FOOTNOTE: a. Any employee who works three days in the week in which a holiday falls shall be paid for the holiday.

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Digging machine, crane, piledriver, lighter, locomotive, derrick, hoist, boom truck, John Henry's, directional drilling machine, cold planer, reclaimer, paver, spreader, grader, front end loader (3 yds. and over), vacuum truck, test boring machine operator, veemere saw, water blaster, hydro-demolition robot, forklift, economobile, Ross Carrier, concrete pump operator and boats

GROUP 2: Well point installation crew

GROUP 3: Utlity engineers and signal persons

GROUP 4: Oiler on cranes

GROUP 5: Combination loader backhoe, front end loader (less than 3 yds.), forklift, bulldozers & scrapers and boats

GROUP 6: Roller,skid steer loaders, street sweeper

GROUP 7: Gas and electric drive heater, concrete mixer, light plant, welding machine, pump & compressor

GROUP 8: Stone crusher

GROUP 9: Mechanic & welder

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* ENGI0057-003 06/01/2023

BUILDING CONSTRUCTION

	Rates	Fringes
Power Equipment Operator		
GROUP 1	$ 44.82	29.90
GROUP 2	$ 42.82	29.90
GROUP 3	$ 42.60	29.90
GROUP 4	$ 38.60	29.90
GROUP 5	$ 35.75	29.90
GROUP 6	$ 41.90	29.90
GROUP 7	$ 41.47	29.90
GROUP 8	$ 38.79	29.90

a.BOOM LENTHS, INCLUDING JIBS:

150 ft. and over: + $ 2.00
180 ft. and over: + $ 3.00
210 ft. and over: + $ 4.00
240 ft. and over: + $ 5.00
270 ft. and over: + $ 7.00
300 ft. and over: + $ 8.00
350 ft. and over: + $ 9.00
400 ft. and over: + $10.00

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

a. FOOTNOTE: Hazmat work: $2.00 per hour additional.
Tunnel/Shaft work: $5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks.

GROUP 2: Digging machine, Ross carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, front end loader (3 yds. and over), vibratory hammer and vacuum truck

GROUP 3: Telehandler equipment, forklift, concrete pump & on-site concrete plant

GROUP 4: Fireman & oiler on cranes

GROUP 5: Oiler on crawler backhoe

GROUP 6: Bulldozer,skid steer loaders,bobcats, tractor, grader, scraper,combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile powered sweeper (3 yds. capacity), 8-ft. sweeper (minimum 65 hp)

GROUP 7: Well point installation crew

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator for light plant, gas and electric driven pump & air compressor

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IRON0037-001 03/16/2023

	Rates	Fringes
IRONWORKER	$ 39.50	32.08

LABO0271-001 11/27/2022

BUILDING CONSTRUCTION

	Rates	Fringes
LABORER		
GROUP 1	$ 35.50	26.85
GROUP 2	$ 35.75	26.85
GROUP 3	$ 36.25	26.85
GROUP 4	$ 36.50	26.85
GROUP 5	$ 37.50	26.85

LABORERS CLASSIFICATIONS

GROUP 1: Laborer, Carpenter Tender, Mason Tender, Cement Finisher Tender, Scaffold Erector, Wrecking Laborer, Asbestos Removal [Non-Mechanical Systems]

GROUP 2: Asphalt Raker, Adzemen, Pipe Trench Bracer, Demolition Burner, Chain Saw Operator, Fence & Guard Rail Erector, Setter of Metal Forms for Roadways, Mortar Mixer, Pipelayer, Riprap & Dry Stonewall Builder, Highway Stone Spreader, Pneumatic Tool Operator, Wagon Drill Operator, Tree Trimmer, Barco-Type Jumping Tamper, Mechanical Grinder Operator

GROUP 3: Pre-Cast Floor & Roof Plank Erectors

GROUP 4: Air Track Operator, Hydraulic & Similar Self-Powered Drill, Block Paver, Rammer, Curb Setter, Powderman & Blaster

GROUP 5: Toxic Waste Remover

LABORERS CLASSIFICATIONS

GROUP 1: Laborer, Carpenter Tender, Mason Tender, Cement Finisher Tender, Scaffold Erector, Wrecking Laborer, Asbestos Removal [Non-Mechanical Systems]

GROUP 2: Asphalt Raker, Adzemen, Pipe Trench Bracer, Demolition Burner, Chain Saw Operator, Fence & Guard Rail Erector, Setter of Metal Forms for Roadways, Mortar Mixer, Pipelayer, Riprap & Dry Stonewall Builder, Highway Stone Spreader, Pneumatic Tool Operator, Wagon Drill Operator, Tree Trimmer, Barco-Type Jumping Tamper, Mechanical Grinder Operator

GROUP 3: Pre-Cast Floor & Roof Plank Erectors

GROUP 4: Air Track Operator, Hydraulic & Similar Self-Powered Drill, Block Paver, Rammer, Curb Setter, Powderman & Blaster

GROUP 5: Toxic Waste Remover

LABO0271-002 11/27/2022

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
LABORER		
COMPRESSED AIR		
Group 1	$ 55.40	24.15
Group 2	$ 52.93	24.15
Group 3	$ 42.45	24.15
FREE AIR		
Group 1	$ 44.05	24.15
Free Air		
Group 1	$ 46.00	24.15
FREE AIR		
Group 2	$ 43.05	24.15
Free Air		
Group 2	$ 45.00	24.15
FREE AIR		
Group 3	$ 40.50	24.15
Free Air		
Group 3	$ 42.45	24.15
LABORER		
Group 1	$ 35.50	24.85
Group 2	$ 35.75	24.85
Group 3	$ 36.50	24.85
Group 4	$ 29.00	24.85
Group 5	$ 37.50	24.85
OPEN AIR CAISSON, UNDERPINNING WORK AND BORING CREW		
Bottom Man	$ 41.50	24.15
Top Man & Laborer	$ 35.60	24.15
TEST BORING		
Driller	$ 41.95	24.15
Laborer	$ 41.95	24.15

LABORER CLASSIFICATIONS

GROUP 1: Laborer; Carpenter tender; Cement finisher tender; Wrecking laborer; Asbestos removers [non-mechanical systems]; Plant laborer; Driller in quarries

GROUP 2: Adzeperson; Asphalt raker; Barcotype jumping tamper; Chain saw operators; Concrete and power buggy operator; Concrete saw operator; Demolition burner; Fence and guard rail erector; Highway stone spreader; Laser beam operator; Mechanical grinder operator; Mason tender; Mortar mixer; Pneumatic tool operator; Riprap and dry stonewall builder; Scaffold erector; Setter of metal forms for roadways; Wagon drill operator; Wood chipper operator; Pipelayer; Pipe trench bracer

GROUP 3: Air track drill operator; Hydraulic and similar powered drills; Brick paver; Block paver; Rammer and curb setter; Powderperson and blaster

GROUP 4: Flagger & signaler

GROUP 5: Toxic waste remover

LABORER - COMPRESSED AIR CLASSIFICATIONS

GROUP 1: Mucking machine operator, tunnel laborer, brake

person, track person, miner, grout person, lock tender, gauge tender, miner: motor person & all others in compressed air

GROUP 2: Change house attendant, powder watchperson, top person on iron

GROUP 3: Hazardous waste work within the ""HOT"" zone

LABORER - FREE AIR CLASSIFICATIONS

GROUP 1: Grout person - pumps, brake person, track person, form mover & stripper (wood & steel), shaft laborer, laborer topside, outside motorperson, miner, conveyor operator, miner welder, heading motorperson, erecting operator, mucking machine operator, nozzle person, rodperson, safety miner, shaft & tunnel, steel & rodperson, mole nipper, concrete worker, form erector (wood, steel and all accessories), cement finisher (this type of work only), top signal person, bottom person (when heading is 50' from shaft), burner, shield operator and TBM operator

GROUP 2: Change house attendant, powder watchperson

GROUP 3: Hazardous waste work within the ""HOT"" zone

LABORER CLASSIFICATIONS

GROUP 1: Laborer; Carpenter tender; Cement finisher tender; Wrecking laborer; Asbestos removers [non-mechanical systems]; Plant laborer; Driller in quarries

GROUP 2: Adzeperson; Asphalt raker; Barcotype jumping tamper; Chain saw operators; Concrete and power buggy operator; Concrete saw operator; Demolition burner; Fence and guard rail erector; Highway stone spreader; Laser beam operator; Mechanical grinder operator; Mason tender; Mortar mixer; Pneumatic tool operator; Riprap and dry stonewall builder; Scaffold erector; Setter of metal forms for roadways; Wagon drill operator; Wood chipper operator; Pipelayer; Pipe trench bracer

GROUP 3: Air track drill operator; Hydraulic and similar powered drills; Brick paver; Block paver; Rammer and curb setter; Powderperson and blaster

GROUP 4: Flagger & signaler

GROUP 5: Toxic waste remover

LABORER - COMPRESSED AIR CLASSIFICATIONS

GROUP 1: Mucking machine operator, tunnel laborer, brake person, track person, miner, grout person, lock tender, gauge tender, miner: motor person & all others in compressed air

GROUP 2: Change house attendant, powder watchperson, top person on iron

GROUP 3: Hazardous waste work within the ""HOT"" zone

LABORER - FREE AIR CLASSIFICATIONS

GROUP 1: Grout person - pumps, brake person, track person,

form mover & stripper (wood & steel), shaft laborer, laborer topside, outside motorperson, miner, conveyor operator, miner welder, heading motorperson, erecting operator, mucking machine operator, nozzle person, rodperson, safety miner, shaft & tunnel, steel & rodperson, mole nipper, concrete worker, form erector (wood, steel and all accessories), cement finisher (this type of work only), top signal person, bottom person (when heading is 50' from shaft), burner, shield operator and TBM operator

GROUP 2: Change house attendant, powder watchperson

GROUP 3: Hazardous waste work within the ""HOT"" zone

PAIN0011-005 06/01/2023

	Rates	Fringes
PAINTER		
Brush and Roller	$ 37.62	22.85
Epoxy, Tanks, Towers, Swing Stage & Structural Steel	$ 39.62	22.85
Spray, Sand & Water Blasting	$ 40.62	22.85
Taper	$ 38.37	22.85
Wall Coverer	$ 38.12	22.85

PAIN0011-006 06/01/2022

	Rates	Fringes
GLAZIER	$ 40.78	23.40

FOOTNOTES:

SWING STAGE: $1.00 per hour additional.

PAID HOLIDAYS: Labor Day & Christmas Day.

PAIN0011-011 06/01/2023

	Rates	Fringes
Painter (Bridge Work)	$ 56.25	23.45

PAIN0035-008 06/01/2011

	Rates	Fringes
Sign Painter	$ 24.79	13.72

PLAS0040-001 06/03/2019

BUILDING CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 36.00	27.15

FOOTNOTE: Cement Mason: Work on free swinging scaffolds under 3 planks width and which is 20 or more feet above ground and any offset structure: $.30 per hour additional.

PLAS0040-002 07/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.85	22.20

PLAS0040-003 07/01/2019

	Rates	Fringes
PLASTERER	$ 37.55	27.50

PLUM0051-002 02/27/2023

	Rates	Fringes
Plumbers and Pipefitters	$ 48.89	31.75

ROOF0033-004 06/01/2023

	Rates	Fringes
ROOFER	$ 42.95	30.00

SFRI0669-001 04/01/2023

	Rates	Fringes
SPRINKLER FITTER	$ 47.55	32.27

SHEE0017-002 12/01/2020

	Rates	Fringes
Sheet Metal Worker	$ 38.58	36.73

TEAM0251-001 05/01/2022

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
TRUCK DRIVER		
GROUP 1	$ 28.46	32.10+A+B+C
GROUP 2	$ 28.61	$ 32.10+A+B+C
GROUP 3	$ 28.66	$ 32.10+A+B+C
GROUP 4	$ 28.71	$ 32.10+A+B+C
GROUP 5	$ 28.81	$ 32.10+A+B+C
GROUP 6	$ 29.21	$ 32.10+A+B+C
GROUP 7	$ 29.41	$ 32.10+A+B+C
GROUP 8	$ 28.91	$ 32.10+A+B+C
GROUP 9	$ 29.16	$ 32.10+A+B+C
GROUP 10	$ 28.96	$ 32.10+A+B+C

FOOTNOTES:

A. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, plus Presidents' Day, Columbus Day, Veteran's Day & V-J Day, providing the employee has worked at least one day in the calendar week in which the holiday falls.

B. Employee who has been on the payroll for 1 year or more but less than 5 years and has worked 150 Days during the last year of employment shall receive 1 week's paid vacation; 5 to 10 years - 2 weeks' paid vacation; 10 or more years - 3 week's paid vacation.

C. Employees on the seniority list shall be paid a one hundred dollar ($100.00) bonus for every four hundred (400) hours worked, up to a maximum of five hundred dollars ($500.00)

All drivers working on a defined hazard material job site shall be paid a premium of $2.00 per hour over applicable rate.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Pick-up trucks, station wagons, & panel trucks

GROUP 2: Two-axle on low beds

GROUP 3: Two-axle dump truck

GROUP 4: Three-axle dump truck

GROUP 5: Four- and five-axle equipment

GROUP 6: Low-bed or boom trailer.

GROUP 7: Trailers when used on a double hook up (pulling 2 trailers)

GROUP 8: Special earth-moving equipment, under 35 tons

GROUP 9: Special earth-moving equipment, 35 tons or over

GROUP 10: Tractor trailer

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union

average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

SECTION 00 4100
BID FORM

THE PROJECT AND THE PARTIES

1.01 TO:

A. Owner

City of Woonsocket
Finance Dept. / Office of Purchasing
City Hall
169 Main Street
Woonsocket, RI

1.02 FOR:

Owner's Project Number: 6161

Water Division's New Garage & Offices

Roy Avenue, Woonsocket, RI

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)

A. Bidder's Full Name _____
   1. Address _____
   2. City, State, Zip_____

1.05 OFFER

A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Bid Documents prepared by Ed Wojcik Architect, Ltd. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

B. _____
_____ dollars
($_____), in lawful money of the United States of America.

C. We have included the required security deposit as required by the Instruction to Bidders.

D. We have included the required performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.
   1. The cost of the required performance assurance bonds is _ _____ _dollars ($_____), in lawful money of the United States of America.

E. City of Woonsocketis a government entity and bids should not include taxes.

1.06 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for thirty days from the bid closing date.

B. If this bid is accepted by Owner within the time period stated above, we will:
   1. Execute the Agreement within seven days of receipt of Notice of Award.
   2. Furnish the required bonds within seven days of receipt of Notice of Award.
   3. Commence work within seven days after written Notice to Proceed of this bid.

1.07 CONTRACT TIME

A. If this Bid is accepted, we will:

B. Complete the Work in _____ calendar days from Notice to Proceed.

1.08 CHANGES TO THE WORK

A. When Architect establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, our percentage fee will be:
   1. _____ percent overhead and profit on the net cost of our own Work;

2. _____ percent on the cost of work done by any Subcontractor.

B. On work deleted from the Contract, our credit to Owner shall be Architect-approved net cost plus _____ of the overhead and profit percentage noted above.

1.09 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
1. Addendum # _____ Dated _____.
2. Addendum # _____ Dated _____.
3. Addendum # _____ Dated _____

1.10 BID FORM SUPPLEMENTS

A. The following information is included with Bid submission:

1.11 BID FORM SIGNATURE(S)

A. _____

B. (Bidder - print the full name of your firm)

C. (Authorized signing officer, Title)

1.12 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.

END OF SECTION

SECTION 00 5000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. The Agreement is based on AIA A101-2017.

B. The General Conditions are based on AIA 201-2017.

C. The Supplementary Conditions are based on RI Housing Supplementary Conditions & AA Regulations (attached)

D. Section 3 of the HUD act of 1968. (attached)

E. Development Sign Specifications (attached)

F. Lead Hazard Reduction Policy (attached)

1.03 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.

B. Bond Forms:
   1. Performance and Payment Bond Form: AIA A312.

C. Post-Award Certificates and Other Forms:
   1. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).

D. Clarification and Modification Forms:
   1. Architect's Supplemental Instructions Form: AIA G710.
   2. Construction Change Directive Form: AIA G714.
   3. Change Order Form: AIA G701.

E. Closeout Forms:
   1. Certificate of Substantial Completion Form: AIA G704.

1.04 REFERENCE STANDARDS

A. AIA A101-2007 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum 2007.

B. AIA A102 - Standard Form of Agreement Between Owner and Contractor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price 2007.

C. AIA A201-2007 - General Conditions of the Contract for Construction 2007.

D. AIA A312 - Performance Bond and Payment Bond 2010.

E. AIA G701 - Change Order 2001.

F. AIA G702 - Application and Certificate for Payment 1992.

G. AIA G703 - Continuation Sheet 1992.

H. AIA G704 - Certificate of Substantial Completion 2000.

I. AIA G710 - Architect's Supplemental Instructions 1992.

J. AIA G714 - Construction Change Directive 2007.

END OF SECTION

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Woonsocket Water Division New Garage & Offices

B. Owner's Name: City of Woonsocket.

C. Architect's Name: Ed Wojcik Architect, Ltd..

D. The Project consists of site work, foundations, pre-manufactured metal building, interior partitions, finishes, plumbing, mechanical, and electrical work.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on AIA A101 as described in Document 00 5200 - Agreement Form.

1.03 OWNER OCCUPANCY

A. Owner intends to occupy a certain portion of the Project prior to the completion date for the entire project..

B. Schedule the Work to accommodate Owner occupancy.

1.04 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Provide access to and from site as required by law and by Owner:
   1. 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.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Time Restrictions:
   1. Contractor shall abide by local ordinances governing noisy activites. It is the contractor's responsibility to verify these ordinances..

D. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

1.05 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

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. Documentation of changes in Contract Price and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

1.03 SCHEDULE OF VALUES

A. Form to be used: AIA G703.

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

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

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

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

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. **SEE BELOW**

1. Payment Period: Submit at intervals stipulated in the Agreement.
2. Form to be used: AIA G702 and G703.
3. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
4. Forms filled out by hand will not be accepted.
5. Execute certification by signature of authorized officer.
6. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
7. Submit Two copies of each Application for Payment.
8. Include the following with the application:
   a. Transmittal letter as specified for submittals in Section 01 3000.
   b. Partial release of liens from major Subcontractors and vendors.
9. When Architect 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.

1.05 MODIFICATION PROCEDURES

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

B. For other required changes, Architect will issue a document signed by 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 Price or Contract Time.
2. Promptly execute the change.

C. For changes for which advance pricing is desired, Architect 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 Five days.

D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect 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 Architect.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

E. 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.

F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

G. 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 Price.

H. 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.

I. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Price, 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 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

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 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. Section 00 2113 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

B. Submittal Form (before award of contract):

C. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. 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 Architect, in order to stay on approved project schedule.

3.04 RESOLUTION

3.05 ACCEPTANCE

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electronic document submittal service.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Construction progress schedule.

F. Submittals for review, information, and project closeout.

G. Number of copies of submittals.

H. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 00 7200 - General Conditions: Dates for applications for payment.

B. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 PROJECT COORDINATOR

A. Project Coordinator: Construction Manager.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for construction access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator'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 Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:
   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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification

documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
2. Contractor and Architect are required to use this service.
3. It is Contractor's responsibility to submit documents in allowable format.
4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.

C. Submittal Service: Use one of the following:
1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.
2. Pro Core

D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.

C. Agenda:
1. Execution of 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 to Contract and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

A. Owner will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.

C. Agenda:
1. Use of premises by Owner and Contractor.

2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by 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.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. **Schedule and administer meetings throughout progress of the Work at maximum weekly intervals.**

B. Make arrangements for video teleconferencing (zoom or equivalent) meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Major subcontractors.

D. 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. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

E. **Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.**

3.05 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 3216

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

B. 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.

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

D. Submit updated schedule with each Application for Payment.

3.06 SUBMITTALS FOR REVIEW

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

3. Samples for verification.

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

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

D. 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.

3.07 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 Architect's knowledge as contract administrator or for Owner.

3.08 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.

D. Submit for Owner's benefit during and after project completion.

3.09 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. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 SUBMITTAL PROCEDURES

A. General Requirements:

B. Transmit each submittal with approved form.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; O'Brien 2006.

1.03 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

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

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

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

E. Submit updated schedule with each Application for Payment.

1.04 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.05 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Sheet Size: Multiples of 11 x 17 inches.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

C. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. References and standards.

C. Testing and inspection agencies and services.

D. Control of installation.

E. Mock-ups.

F. Defect Assessment.

1.02 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2014).

B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation 2014.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry 2013.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2012a.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing 2014a.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect 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 Architect, provide interpretation of results.
   2. Test report submittals are for Architect'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 Owner's information.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, 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 Architect.

D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

E. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 30 days of observation to Architect for information.
   2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

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 Architect before proceeding.

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

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

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

C. Contractor Employed Agency:
   1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.

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 Architect 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. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect 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 Architect.

3.03 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect 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 Architect and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.

C. 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.

D. 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 Architect 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 Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

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

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

3.04 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 workmanshipstart-up of equipment,test, adjust and balance of 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.

3.05 DEFECT ASSESSMENT

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

B. If, in the opinion of Architect, upon consultation with the Owner it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:

B. 2021 RI State Fire Code, adopting NFPA 1 and NFPA 101, 2018 edition and NFPA 72 2019 edition

C. 2021 Rhode Island State Building Code, adopting IBC, IPC, IMC, IECC 2018 editions

D. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.

E. FED-STD-795 - Uniform Federal Accessibility Standards (UFAS) 1988.

F. 29 CFR 1910 - Occupational Safety and Health Standards current edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

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 sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Field offices.

1.02 TEMPORARY UTILITIES

A. Contractor will provide the following including utility and fuel charges:
   1. Electrical power , consisting of New temporary power pole as required..
   2. Allowance for heat to the building during winter conditions. See SECTION 01 2100 ALLOWANCES.
      a. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.03 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.

1.04 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization. Contractor shall provide to Owner and Architect the name of a contact person and telephone # for 24 hour access related to on site emergency issues.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.06 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.

1.07 SMOKING

A. **Smoking is not permitted on the work site.**

B. Post signs and educate subcontractors to the no smoking policy.

1.08 FENCING

A. Construction: Contractor's option.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.09 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.10 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 Owner.

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

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

1.11 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.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

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. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

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 REFERENCE STANDARDS

A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content Current Edition.

B. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products 2012.

C. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action www.greenscreenchemicals.org.

D. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action www.greenscreenchemicals.org.

E. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures 2006.

F. ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework 2006.

G. ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines 2006.

H. ISO 21930 - Sustainability in building construction -- Environmental declaration of building products 2007.

1.04 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.

1.05 QUALITY ASSURANCE

A. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.

1. Good: Product-specific; compliant with ISO 14044.
2. Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
3. Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
4. Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.

B. GreenScreen Chemical Hazard Analysis: Ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).
1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
2. Better: GreenScreen Full Assessment.
3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
4. Acceptable Evidence: GreenScreen report.

C. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
1. Previously used, reused, refurbished, and salvaged products are not considered recycled.
2. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.
3. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of materials in the item.
4. Determine value of recycled content of each item separately, by multiplying the content percentage by the value of the item.
5. Acceptable Evidence:
   a. For percentage of recycled content, information from manufacturer.
   b. For cost, Contractor's cost data.

D. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
1. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit http://www.fsccanada.org, for the USA visit http://www.fscus.org.
2. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

2.02 NEW PRODUCTS

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

B. Use of products having any of the following characteristics is not permitted:
1. Made outside the United States, its territories, Canada, or Mexico.
2. Made using or containing CFC's or HCFC's.
3. Made of wood from newly cut old growth timber.

C. 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.
3. Have a published GreenScreen Chemical Hazard Analysis.

2.03 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.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

3.02 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.

3.03 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. Provide off-site storage and protection when site does not permit on-site storage or protection.

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

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

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

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

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

L. 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 6116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirement for installer certification that they did not use any non-compliant products.

B. VOC restrictions for product categories listed below under "DEFINITIONS."

C. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.02 DEFINITIONS

A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site in the building interior:
   1. Adhesives, sealants, and sealer coatings.
   2. Carpet.
   3. Carpet cushion.
   4. Carpet tile.
   5. Resilient floor coverings.
   6. Paints and coatings.
   7. Insulation.

B. Interior of Building: Anywhere inside the exterior weather barrier.

C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.03 REFERENCE STANDARDS

A. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org current edition.

B. Green Seal GS-11 - Paints, Coatings, Stains, and Sealers; 2015

C. GreenSeal GS-36 - Commercial Adhesives 2011.

D. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113 current edition.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168 current edition.

F. SCS (CPD) - SCS Certified Products current listings at www.scscertified.com.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Evidence of Compliance: Submit for each different product in each applicable category.

C. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

D. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified in State of California Department of Health Services Standard

Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers.

1. Evidence of Compliance: Acceptable types of evidence are:
   a. Current GREENGUARD Children & Schools certification; www.greenguard.org.
   b. Current Carpet and Rug Institute Green Label Plus certification; www.carpet-rug.org.
   c. Current SCS Floorscore certification; www.scscertified.com.
   d. Current SCS Indoor Advantage Gold certification; www.scscertified.com.
   e. Product listing in the CHPS Low-Emitting Materials Product List at www.chps.net/manual/lem_table.htm.
2. Product data submittals showing VOC content are NOT acceptable forms of evidence.

C. Joint Sealants: Provide products having VOC content as specified in Section 07 9005.

D. Paints and Coatings: Provide products having VOC content as specified in Section 09 9000.

E. Carpet, Carpet Cushion, and Adhesive: Provide products having VOC content as specified in Section 09 6816.

F. Carpet Tile and Adhesive: Provide products having VOC content as specified in Section 09 6813.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

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. Cutting and patching.

C. Surveying for laying out the work.

D. Cleaning and protection.

E. Demonstration and instruction of Owner personnel.

F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

G. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.

E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

F. Section 02 4100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

G. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2013.

1.04 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.
   5. Work of Owner or separate Contractor.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction

activities,

1.06 PROJECT CONDITIONS

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

B. 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.

C. 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.

D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

E. Pest and Rodent Control: Project site to be batited by extermination company prior to start of construction activities. Maintain baits throughout the duration of the project as required. Provide methods, means, and facilities to prevent pests and insects from damaging the work.

F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 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. Insure that all subcontractors are aware of energy efficiency and air sealing requirements and coordinate work to ensure projected Energy Star rating is acheived, as specified in the performance path requirements of the Massachusetts and Rhode Island Energy Star Homes Technical Standards Version 3.0

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

D. 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.

E. 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.

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

G. Coordinate completion and clean-up of work of separate sections.

H. After 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 Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

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.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

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 LAYING OUT THE WORK

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

B. Promptly notify Architect 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 Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. 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.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 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.

3.05 CUTTING AND PATCHING

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

B. See Alterations article above for additional requirements.

C. 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.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

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

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

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

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

J. 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.

3.06 PROGRESS CLEANING

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

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 periodically and dispose off-site; do not burn or bury.

3.07 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.

3.08 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.

3.09 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING

A. Coordinate final cleaning with required lead testing and punchlist.

B. Use cleaning materials that are nonhazardous.

C. 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.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Clean all interiors of cabinets including drawers and shelves. Remove all construction related debris.

J. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect.
   2. Provide copies to Owner.

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 Architect when work is considered ready for Architect'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 Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood.
   5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

G. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Sustainable Design Submittals: Submit Waste Management Plan and Waste Disposal Reports in accordance with procedures specified in Section 01 3566.13 - Sustainability Certification Project Procedures - Green Globes.

C. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
   1. Submit to Architect for Owner's review and approval.
   2. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
   3. Describe as many alternatives to landfilling as possible:
      a. List each material proposed to be salvaged, reused, or recycled.
      b. List the proposed local market for each material.
   4. Provide alternatives to landfilling for at least the following materials:
      a. Land clearing debris, including brush, branches, logs, and stumps.
      b. Concrete.
      c. Bricks.
      d. Concrete masonry units.

e. Asphalt paving.

D. Once Owner has determined which of the landfill alternatives addressed in the Proposal above are acceptable, prepare and submit Waste Management Plan; submit within 10 calendar days after notification by Architect.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

B. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

C. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

D. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

E. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

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.

D. Construction Completion & Tenant Occupancy

1.02 SUBMITTALS

A. Project Record Documents: Submit documents to Architect 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. Architect 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 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 Architect 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 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.

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. Addenda.
   3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

F. Permit Documents: Keep a copy of all permits and signoffs for each trade.
   1. Submit to Owner all copies of permits at project conclusion.

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:

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. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include manufacturer's printed operation and maintenance instructions.

E. 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 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 Architect, 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. 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 Architect, 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. Operating instructions.
      b. Maintenance instructions for equipment and systems.
      c. 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. Photocopies of warranties and bonds.

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 Owner's 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.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete foundation walls.

D. Concrete reinforcement.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads and light pole bases.

G. Concrete curing.

H. Concrete Piers

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

B. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete 2010 (Errata 2012).

D. ACI 302.1R - Guide for Concrete Floor and Slab Construction 2004 (Errata 2007).

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000.

F. ACI 305R - Hot Weather Concreting 2010.

G. ACI 306R - Cold Weather Concreting 2010.

H. ACI 308R - Guide to Curing Concrete 2001 (Reapproved 2008).

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2011.

J. ACI 347R - Guide to Formwork for Concrete 2014.

K. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

L. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement 2015.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2013.

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2015a.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2015.

P. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2012.

Q. ASTM C150/C150M - Standard Specification for Portland Cement 2015.

R. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a.

S. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2014.

T. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.

U. 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.

V. 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 showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. Test Reports: Submit report for each test or series of tests specified.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.
   1. Form: Coiled Rolls.
   2. Mesh Size and Wire Gage: As indicated on drawings.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

2.05 ACCESSORY MATERIALS

A. Underslab Vapor Retarder:
   1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Minimum 6 mil, single ply polyethylene is prohibited.
   2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4000 psi.
   2. Water-Cement Ratio: Maximum 40 percent by weight.
   3. Maximum Slump: 3 inches.
   4. Maximum Aggregate Size: 5/8 inch.

2.07 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.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
   1. Exposed Concrete Floors: 1/4 inch in 10 feet.
   2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
   3. Under Carpeting: 1/4 inch in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
   2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
   3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Mortar and grout.

C. Reinforcement and anchorage.

D. Flashings.

E. Lintels.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

1.03 REFERENCE STANDARDS

A. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2009a (Reapproved 2014).

B. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2011.

C. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2015.

D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2014.

E. ASTM C150/C150M - Standard Specification for Portland Cement 2015.

F. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2006 (Reapproved 2011).

G. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2014a.

H. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane 2013.

I. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

J. The Secretary of the Interior's Standards for Rehabilitation of Historic Structures.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, mortar, and masonry accessories.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

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 depth of 8 inches.
2. Load-Bearing Units: ASTM C90, normal weight.
3. Special Units with Factory-Installed Insulation Inserts: ASTM C90, normal weight.
   a. Type: Special shape without end webs; with continuous horizontal insulation inserts.
   b. Insulation Type: Manufacturer's standard expanded polystyrene (XPS).
   c. Size: Nominal face dimensions of 16 inches by 8 inches and nominal depths as indicated on drawings for specific locations.
   d. Exposed Faces: Split Face -Color and texture to be selected from manufacturer's standard range.
   e. Manufacturers:
      1) The Concrete Products Group; Spec-Brik Hi-R: www.concreteproductsgroup.com/#sle.
      2) Substitutions: See Section 01 6000 - Product Requirements.

2.02 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II.
   1. Not more than 0.60 percent alkali.

B. Hydrated Lime: ASTM C207, Type S.

C. Sand: ASTM C 144.

D. Water: Clean and potable.

E. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

F. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
   1. Use only in combination with masonry units manufactured with integral water repellent admixture.
   2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
   3. Meet or exceed performance specified for water repellent admixture used in masonry units.

2.03 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; uncoated finish.

B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Ladder.
   2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

2.04 FLASHINGS

A. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch thick.

2.05 LINTELS (STEEL SEE STRUCTURAL DRAWINGS)

2.06 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Mortar mix shall closely match the composition of the existing mortar. Provide testing to analyze existing composition.
      a. Interior, loadbearing masonry: Type N.

B. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

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. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

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. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

F. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.07 LINTELS

A. Install loose steel lintels over openings. See drawings for size

B. Maintain minimum 6 inch bearing on each side of opening.

3.08 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Maximum Variation from Alignment of Columns: 1/4 inch.

C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.09 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 joist framing and bridging.

1.02 DEFINITIONS

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016.

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing 2015.

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures 2010, with 2013 Supplements and Errata.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2009.

E. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members 2015.

F. ICC (IBC) - International Building Code 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on cold-formed steel structural members; include material descriptions and base steel thickness.

C. Product Data: Provide manufacturer's data on factory-made connectors and mechanical fasteners, showing compliance with requirements.

D. Design Data:

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a professional structural engineer experienced in designing this work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Structural Framing:
   1. ClarkDietrich: www.clarkdietrich.com/#sle.
   2. MarinoWARE: www.marinoware.com/#sle.
   3. Steel Construction Systems: www.steelconsystems.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Connectors:
   1. Same manufacturer as metal framing.

2.02 PERFORMANCE REQUIREMENTS

A. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI

S240.

B. Design Criteria: In accordance with applicable codes.
   1. Live load deflection meeting the following, unless otherwise indicated:
      a. Floors: Maximum vertical deflection under live load of 1/480 of span.
   2. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   3. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.

2.04 STRUCTURAL FRAMING COMPONENTS

A. Joists: AISI S240; manufactured, c shaped joists.
   1. Structural Grade: As required to meet design criteria.
   2. Thickness and Depth: As indicated on drawings.

2.05 CONNECTIONS

A. Performance Requirements: Provide connections in compliance with requirements of AISI S240.

B. Structural Performance: Maintain load and movement capacity required by applicable building code and specified design criteria.

2.06 MISCELLANEOUS CONNECTIONS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A153/A153M.

2.07 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION - GENERAL

A. Install structural members and connections in compliance with AISI S240.

3.03 INSTALLATION OF JOISTS

A. Install framing components in accordance with manufacturer's instructions.

B. Set floor joists parallel and level, with lateral bracing and bridging.

C. Locate joist end bearing directly over load-bearing studs or provide load distribution on top of stud track.

END OF SECTION

SECTION 05 5100
METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stairs with metal treads.

B. Structural steel stair framing and supports.

C. Handrails and guards.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2015.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2009.

D. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates 2015.

E. 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.

F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.

G. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015.

H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic") 2002 (Ed. 2004).

1.03 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.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.04 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
   2. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
   3. Dimensions: As indicated on drawings.
   4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   6. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:

1. Service: Exposed joints tight with face surfaces aligned; underside of stair not covered by soffit is not considered exposed to view.
   a. Welded Joints: Welded on back side wherever possible.
   b. Welds Exposed to View: Ground smooth; not required to be flush.
   c. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts or screw threads.
   d. Metal Surfaces to be Painted: Sanded smooth, suitable for satin or matte finish.
2. Industrial: All joints made neatly.
   a. Welded Joints: Welded on back side wherever possible.
   b. Welds Exposed to Touch: Ground smooth.
   c. Bolts Exposed to Touch in Travel Area: No nuts or screw threads exposed to touch.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH METAL TREADS

A. Jointing and Finish Quality Level: Service, as defined above.

B. Risers: Closed.

C. Treads: Checkered steel plate.
   1. Tread Thickness: 1/4 inch, minimum.
   2. Anchorage to Stringers: Welded or bolted to carrier angles welded or bolted to stringers.

D. Risers: Steel sheet.
   1. Riser Thickness: As required by design; 14 gauge, 0.075 inch minimum.
   2. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.

E. Stringers: Rolled steel channels.
   1. Stringer Depth: 10 inches.
   2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Railings: Steel pipe railings.

2.03 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: See Section 05 5213.

B. Guards: Pipe railings, see Section 05 5213.

2.04 MATERIALS

A. Steel Sections: ASTM A36/A36M.

B. Checkered Plate: ASTM A786/A786M, rolled steel floor plate; manufacturer's standard pattern.

2.05 ACCESSORIES

A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, and comply with VOC limitations of authorities having jurisdiction.

2.06 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
   1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Provide welded field joints where specifically indicated on shop drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

E. Obtain approval prior to site cutting or creating adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails. (Interior)

B. Stair railings and guardrails.

1.02 REFERENCE STANDARDS

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2012.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2015.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2013.

D. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic") 2002 (Ed. 2004).

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Allow for expansion and contraction of members and building movement without damage to connections or members.

C. Dimensions: See drawings for configurations and heights.
   1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
   2. Posts: 1-1/2 inches diameter, round.
   3. Balusters: 1/2 inch square solid bar.

D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

E. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, black finish.

C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

D. Galvanizing: In accordance with requirements of ASTM A123/A123M.
   1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. 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.

2.04 FINISHES

A. Galvanized

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.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Communications and electrical room mounting boards.

B. Concealed wood blocking, nailers, and supports.

C. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2009.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2015a.

C. PS 1 - Structural Plywood 2009.

D. PS 20 - American Softwood Lumber Standard 2010.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. 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.

1.05 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 species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at 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 FOR CONCEALED APPLICATIONS

A. Moisture Content: S-dry or MC19.

B. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 fire-rated plywood; 3/4 inch thick; tested in accordance with ASTM E84.

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.

PART 3 EXECUTION

3.01 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.

3.02 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 authorities having jurisdiction 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 nonstructural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.

3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

3.04 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.

3.05 CLEANING

A. Waste Disposal: See Section 01 7419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casings and moldings.

1.02 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014.

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0 2016.

C. PS 1 - Structural Plywood 2009.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide Wood Trim and casing product data.
   1. Provide data on wood structural adhesive paste and wood consolidant.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Trim: Primed finger jointed pine or poplar; prepare for paint finish.

2.02 LUMBER MATERIALS

A. Softwood Lumber: Finger Jointed Pine or Poplar species, plain sawn, maximum moisture content of 6 percent; with flat grain, paint grade.

2.03 SHEET MATERIALS

A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

2.04 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application; plain finish in concealed locations and colored finish in exposed locations.

C. Fasteners for Exterior Applications: Stainless steel; length required to penetrate wood substrate 1-1/2 inch minimum.

2.05 ACCESSORIES

A. Lumber for Shimming, Blocking, and miscShims: Softwood lumber of any species.

B. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

C. 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.

2.07 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at perimeter foundation wall. as detailed at new construction

B. Batt Insulation: SEE SECTION 13 3419 METAL BUILDING SYSTEMS

C. Foam insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

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 E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2015a.

D. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C 2012.

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.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation at Inside of Perimeter of Foundation: Extruded polystyrene board.

B. Insulation in Metal Framed Walls: (See Section 13 3419 Metal Building Systems)

C. Insulation over roof deck: Specified under Section 13 3419 Metal Building Systems

2.02 FOAM BOARD INSULATION MATERIALS

A. 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. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   3. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
   4. Board Edges: Square.
   5. Thickness: 2" - R-10 along inside foundation wall to 24" below slab.
   6. Products:
      a. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.

1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
2. Thermal Resistance: R-value of 20 min. at exterior walls
3. Facing: Unfaced.
4. Products:
   a. CertainTeed Corporation: www.certainteed.com/#sle.
   b. Johns Manville: www.jm.com/#sle.
   c. Owens Corning Corp: www.owenscorning.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.

2.04 ACCESSORIES

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.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

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.

3.03 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory-applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

G. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over face of member.

END OF SECTION

SECTION 07 7123
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-finished aluminum gutters and downspouts.

1.02 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric] 2014.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
   1. Finish: Plain, shop pre-coated with modified silicone coating.
   2. Color: To match Corner Trim.

2.02 COMPONENTS

A. Gutters: "K" Style rectangular style profile.

B. Downspouts: CDA Rectangular profile.

C. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Gutter Supports: Brackets.
   2. Downspout Supports: Straps.

D. Fasteners: Same material and finish as gutters and downspouts , with soft neoprene washers.

2.03 ACCESSORIES

A. Downspout Boots: Plastic.

2.04 FABRICATION

A. Form gutters and downspouts of profiles and size indicated.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

3.02 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Set splash pans under downspouts.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2015.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops 2013a.

C. ITS (DIR) - Directory of Listed Products current edition.

D. FM (AG) - FM Approval Guide current edition.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168 current edition.

F. UL 1479 - Standard for Fire Tests of Penetration Firestops Current Edition, Including All Revisions.

G. UL (DIR) - Online Certifications Directory current listings at database.ul.com.

H. UL (FRD) - Fire Resistance Directory current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

C. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.

D. Manufacturer's qualification statement.

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 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.03 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Blank Openings:

B. Penetrations By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System W-L-1222; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System W-L-2241; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (For Wood Frame Construction).
      b. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Electrical Cables Not In Conduit:

2.04 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2006 (Reapproved 2011).

B. ASTM C834 - Standard Specification for Latex Sealants 2014.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2014.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2013.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168 current edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 01 6116.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.

1.05 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 that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   2. Pecora Corporation: www.pecora.com.
   3. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
   4. Sika Corporation: www.usa-sika.com/#sle.
   5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
   6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.
      e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag silyl-terminated polyether/polyurethane sealant, unless otherwise indicated.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
   1. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
   2. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.

D. Interior Wet Areas: Bathrooms and restrooms; fixtures in wet areas include plumbing fixtures, countertops, and other similar items.

E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

A. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Color: White.

B. Hybrid Urethane Polyether (STPE) and Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Manufacturers:
      a. Franklin International Inc; Titebond WeatherMaster ULTIMATE MP Sealant: www.titebond.com/#sle.
      b. Sherwin-Williams Company; Stampede 100 Low-Modulus Hybrid Urethane Sealant: www.sherwin-williams.com/#sle.
      c. Tremco Commercial Sealants and Waterproofing; Dymonic FC: www.tremcosealants.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Manufacturers:
      a. Sherwin-Williams Company; Stampede-1/-TX Polyurethane Sealant: www.sherwin-williams.com/#sle.
      b. Sika Corporation; Sikaflex-1a: www.usa.sika.com/#sle.
      c. Tremco Commercial Sealants & Waterproofing; Dymeric 240 FC: www.tremcosealants.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.

2.05 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Open Cell: 40 to 50 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

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. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated insulated hollow metal doors and frames.

B. Fire-rated hollow metal doors and frames.

C. Thermally insulated hollow metal doors with frames.

D. Accessories, including glazing.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

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 A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable 2015.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2014.

H. ICC A117.1 - Accessible and Usable Buildings and Facilities 2009.

I. ITS (DIR) - Directory of Listed Products current edition.

J. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames 2007.

K. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2016.

L. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2012.

M. UL (DIR) - Online Certifications Directory current listings at database.ul.com.

N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.03 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.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
   3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
   4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.

B. Hollow Metal Panels: Same construction, performance, and finish as doors.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
      e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
   3. Door Thickness: 1-3/4 inches, nominal.
   4. Top Closures for Outswinging Doors: Flush with top of faces and edges.
   5. Weatherstripping: Refer to Section 08 7100.

C. Fire-Rated Doors:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
   2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").

3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
   a. Attach fire rating label to each fire rated unit.
4. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Exterior Door Frames: Full profile/continuously welded type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
   3. Frame Finish: Factory primed and field finished.
   4. Weatherstripping: Integral, recessed into frame edge.

C. Door Frames, Fire-Rated: Face welded type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
   3. Frame Finish: Factory primed and field finished.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Glazing: Insulated tempered glazing, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

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. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install door hardware as specified in Section 08 7100.

E. Touch up damaged factory finishes.

3.03 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 1116
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazed aluminum doors.

B. Aluminum frames.

C. Glazing.

1.02 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.

B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels 2013.

D. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2015.

F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric] 2014.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.

J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric] 2013.

K. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.

L. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).

M. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2009).

N. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes 2014.

O. 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 descriptive literature for each type of door; include information on fabrication methods.

C. Shop Drawings: Include elevations of each opening type.
   1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.

D. Selection Samples: Complete set of color and finish options, using actual materials, for Architect's selection.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum components in manufacturer's standard protective packaging, palleted, crated, or banded together.

B. Inspect delivered components for damage and replace. Repaired components will not be accepted.

C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.

D. Protect materials and finish from damage during handling and installation.

PART 2 PRODUCTS

2.01 DOORS AND FRAMES

A. Accessibility: Comply with ICC A117.1 and ADA Standards.

B. Glazed Aluminum Doors: Extruded aluminum, Thermally broken tube frame, full glazed, with middle rail; factory glazed.
   1. Thickness: 1-3/4 inches, nominal.
   2. Stile Width: 5 inches, nominal.
   3. Finish: Superior performing organic coating.
   4. Texture: Smooth.
   5. Glazing, Exterior Doors: Sealed insulating units, 1 inch thick, made of clear 1/4 inch thick fully tempered glass. **U- Value of glazing to be less than or equal to 0.30 in order to comply with energy star requirements.**

C. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, thermally broken hollow or C-shaped sections; no steel components.
   1. Frame Depth: 4-1/4 inches.
   2. Finish: Same as doors.
   3. Weatherstripping: Replaceable pile type; at jambs and head.

D. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
   1. Provide vision lites as indicated on drawings.

2.02 COMPONENTS

A. Flush Door Panels: Without visible seams on face sheet.
   1. Framing and Hardware Backup: Extruded aluminum tubing, 1/8 inch minimum thickness.
   2. Perimeter Edges: Extruded aluminum cap.
   3. Laminating Adhesive: Manufacturer's standard low-VOC materials.

B. Tubular Doors: Extruded aluminum tubing, 1/8 inch minimum thickness, with heavy-duty plated steel through bolts in rails, glazing stops, and glazing gaskets.

C. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.
   1. Corner Brackets: Extruded aluminum, fastened with stainless steel screws.
   2. Trim: Extruded aluminum, not less than 0.062 inch thick, removable snap-in type without exposed fasteners.

D. Vision Lites: Extruded aluminum framed, gasket glazed.
   1. Glazing: Sealed insulating glass units, 1 inch thick, with two panes of clear 1/4 inch thick fully tempered glass.

E. Additional Door Hardware: See Section 08 7100.

2.03 PERFORMANCE REQUIREMENTS

A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.

B. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 and Wind Zone 4 - Additional Protection for Large and Small Missile impact and pressure cycling at design wind pressure.

C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf.

D. Air Leakage: Maximum of 0.1 cu ft/min/sq ft at 6.27 psf differential pressure, when tested in accordance with ASTM E283/E283M.

E. Condensation Resistance Factor: 50, measured in accordance with AAMA 1503.

F. Overall U-value, Including Glazing: 0.35, minimum, measured on exterior door size required for this project.

2.04 MATERIALS

A. Aluminum Sheet: ASTM B209/B209M, alloy 5005, temper H14, stretcher leveled.

B. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063, temper T5, or alloy 6463, temper T5.

2.05 FINISHES

A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

2.06 ACCESSORIES

A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.

B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil thickness per coat.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.

B. Replace components with damage to exposed finishes.

C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.

B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.

C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of

bituminous paint.

D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.04 CLEANING

A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.

B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.

B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

SECTION 08 1213
HOLLOW METAL FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal frames for non-hollow metal doors.

B. Fire-rated hollow metal frames for non-hollow metal doors.

C. Interior glazed borrowed lite frames.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

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 A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable 2015.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2014.

H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames 2014.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities 2009.

J. ITS (DIR) - Directory of Listed Products current edition.

K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.

L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.

M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames 2007.

N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2016.

O. UL (DIR) - Online Certifications Directory current listings at database.ul.com.

P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.03 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.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with applicable requirements and in compliance with standards and/or custom guidelines as indicated.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
   3. Steelcraft, an Allegion brand: www.allegion.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Door Frame Type: Provide hollow metal door frames with integral casings.
   1. Interior Doors: Use frames with integral casings.

B. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

C. Accessibility: Comply with ICC A117.1 and ADA Standards.

D. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior frame that is also indicated as being sound-rated must comply with the requirements specified for exterior frames and for sound-rated frames; where two requirements conflict, comply with the most stringent.

E. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115, NAAMM HMMA 830, NAAMM HMMA 831 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

2.03 HOLLOW METAL DOOR FRAMES WITH INTEGRAL CASINGS

A. Frame Finish: Factory primed and field finished.

B. Interior Door Frames, Non-Fire Rated: Knock-down type.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.

C. Fire-Rated Door Frames: Face welded type.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
   2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C or NFPA 252 ("positive pressure fire tests").
   3. Provide units listed and labeled by ITS (DIR) or UL (DIR).
      a. Attach fire rating label to each fire rated unit.

2.04 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.05 ACCESSORIES

A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

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 frames in accordance with manufacturer's instructions and related requirements of specified frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Comply with glazing installation requirements of Section 08 8000.

E. Install door hardware as specified in Section 08 7100.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS

A. Section 06 2000 - Finish Carpentry: Wood door frames.

B. Section 08 1213 - Hollow Metal Frames.

C. Section 08 7100 - DOOR HARDWARE.

D. Section 08 8000 - Glazing.

E. Section 09 9000 - Painting and Coating

F. Section 09 9300 - Staining and Transparent Finishing: Field finishing of doors.

1.03 REFERENCE STANDARDS

A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2012.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014.

C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2016.

D. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

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.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of 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, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and 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. Wood Veneer Faced Doors:
   1. Eggers Industries: www.eggersindustries.com.
   2. Graham Wood Doors: www.grahamdoors.com.
   3. Marshfield DoorSystems, Inc: www.marshfielddoors.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND PANELS

A. Doors: See drawings for locations and additional requirements.
   1. Quality Level: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS).
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire Rated Doors: Tested to 60 minutes in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
   3. Wood veneer facing for field transparent finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White 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.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 ACCESSORIES

A. Hollow Metal Door Frames: See Section 08 1213.

B. Glazed Openings:
   1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.

C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

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.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Use machine tools to cut or drill for hardware.

C. Coordinate installation of doors with installation of frames and hardware.

D. Coordinate installation of glazing.

3.03 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

SECTION 08 3323
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior coiling doors.

B. Electric operators and control stations.

C. Wiring from electric circuit disconnect to operators and control stations.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2015.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2015.

D. ITS (DIR) - Directory of Listed Products current edition.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.

F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2000 (R2005), with errata, 2008.

G. UL (DIR) - Online Certifications Directory current listings at database.ul.com.

H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

1.03 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. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

B. 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 and indicated.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide five-year manufacturer warranty for three-ply multifilament polyester fabric curtain. Complete forms in Owner's name and register with manufacturer.

C. Manufacturer Warranty: Provide 2-year manufacturer warranty for roller shaft counterbalance assembly. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:
   1. Clopay Building Products: www.clopaydoor.com/#sle.
   2. Raynor Garage Doors: www.raynor.com/#sle.
   3. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.

2.02 COILING DOORS

A. Exterior Coiling Doors: Steel slat curtain.
   1. Capable of withstanding positive and negative wind loads of 20 psf without undue deflection or damage to components.
   2. Sandwich Slats: Manufacturer's standard, with core of foamed-in-place polyurethane insulation; minimum R-value of 4.88.
   3. Nominal Slat Size: 2 inches wide by required length.
   4. Finish: Factory painted, color as selected.
   5. Guide, Angles: Galvanized steel.
   6. Hood Enclosure: Manufacturer's standard; primed steel.
   7. Electric operation.
   8. Mounting: Within framed opening.

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, ___ gauge, ___ 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 - Angle: ASTM A36/A36M metal angles, size as indicated.
   1. Hot-dip galvanized in compliance with ASTM A123/A123M.

D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
   1. Prime painted.

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:
   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 Architect 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 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with operating sash.

B. Factory glazing.

C. Operating hardware.

D. Insect screens.

1.02 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights 2011.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site 2015.

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels 2013.

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric] 2013.

F. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2009).

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Include component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements. Shop Drawings shall be used for approval

D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:

E. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum Five years of experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least Five years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units. Complete forms in Owner's name and register with manufacturer.

C. Manufacturer Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with manufacturer.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN - AW PERFORMANCE CLASS WINDOWS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 having Performance Class of AW, and Performance Grade of 100.

B. Projected, Face of Sash and Frame in Approximately Same Plane:
   1. Basis of Design: Winco 1150.

C. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another manufacturer.

2.02 ALUMINUM WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 2 inch.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Performance Requirements: Provide products that comply with the following:

C. Horizontal Pivoting Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Exterior Finish: High performance organic coatings.
   4. Interior Finish: High performance organic coatings.

2.03 PERFORMANCE REQUIREMENTS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
   1. Performance Class (PC): AW.
   2. Performance Grade (PG): Equivalent to or greater than specified design pressure.

B. Design Pressure (DP): In accordance with applicable codes.

C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.

D. Air Leakage: 0.1 cfm/sq ft maximum leakage per unit area of outside window frame dimension when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.

E. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.

2.04 COMPONENTS

A. Frames: 2 inch wide by 2 inch deep profile, of .080 inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.

B. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
   1. Hardware: Spring loaded steel pins; four per screen unit.
   2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
   3. Frame Finish: Same as frame and sash.

C. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.

D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.05 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5005 alloy, H12 or H14 temper.

2.06 HARDWARE

A. Sash lock: Lever handle with cam lock.

B. Pulls: Manufacturer's standard type.

C. Limit Stops: Resilient rubber.

2.07 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
   1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as selected from manufacturer’s standard line.

B. Finish Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining water-resistive barrier materials are ready to receive aluminum windows; see Section 07 2500.

3.02 PRIME WINDOW INSTALLATION

A. Install windows in accordance with manufacturer's instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sill and sill end angles.

E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Install operating hardware not pre-installed by manufacturer.

3.03 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.04 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for hollow metal doors.

B. Hardware for fire-rated doors.

C. Electrically operated and controlled hardware.

D. Thresholds.

E. Weatherstripping, seals and door gaskets.

1.02 REFERENCE STANDARDS

A. BHMA A156.1 - American National Standard for Butts and Hinges 2013.

B. BHMA A156.3 - American National Standard for Exit Devices 2014.

C. BHMA A156.4 - American National Standard for Door Controls - Closers 2013.

D. BHMA A156.7 - American National Standard for Template Hinge Dimensions 2014.

E. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders 2010.

F. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000 2012.

G. BHMA A156.18 - American National Standard for Materials and Finishes 2012.

H. BHMA A156.21 - American National Standard for Thresholds 2014.

I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2016.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.

C. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.

D. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with 10 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide 3 year warranty for door closers and interconnected locks.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Allegion Brands, Ives: www.allegion.com/us.

2.02 DOOR HARDWARE - GENERAL

A. Provide hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Provide items of a single type of the same model by the same manufacturer.

C. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   2. Fire-Rated Doors: NFPA 80.
   3. Hardware on Fire-Rated Doors, Except Hinges: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
   4. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.

D. Finishes: Provide door hardware of the same finish unless otherwise indicated.
   1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
   2. Finish Definitions: BHMA A156.18.
   3. Exceptions:
      a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
      b. Hinges for Fire-Rated Doors: Steel base metal with painted finish.

2.03 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. If no hardware set is indicated for a swinging door provide an office lockset.
   2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Lock Cylinders: Manufacturer’s standard tumbler type, six-pin standard core.
   1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed. Coordinate with Owner

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.04 HINGES

A. Hinges: Provide hinges on every swinging door.
   1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   2. Provide non-removable pins on exterior outswinging doors.

B. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7; standard weight, unless otherwise indicated.
   1. Provide hinge width required to clear surrounding trim.

C. Quantity of Hinges Per Door:
   1. Doors From 60 inches High up to 90 inches High: Three hinges.
   2. Doors 90 inches High up to 120 inches High: Four hinges.

D. Manufacturers - Hinges:
   1. Hager Companies: www.hagerco.com.
   2. Stanley Black & Decker: www.stanleyblackanddecker.com.

2.05 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. Hardware Sets indicate locking functions required for each door.
   2. If no hardware set is indicated for a swinging door provide an office lockset.
   3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
   1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed.

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.06 MORTISE LOCKSETS

A. Mortise Locksets - All doors

B. Locking Functions: As defined in BHMA A156.13, and as follows:
   1. Passage: F01.
   2. Office: F04, key not required to lock, remains locked upon exit.

C. Manufacturers - Mortise Locksets:
   1. Schlage, an Allegion brand: www.allegion.com/us.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.07 FLUSHBOLTS AND COORDINATORS

A. Flushbolts: Lever extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
   1. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
   2. Floor Bolts: Provide dustproof strike except at metal thresholds.

2.08 ELECTRIC STRIKES

A. Manufacturers - Electric Strikes:
   1. Assa Abloy Brands, Folger Adam EDC: www.assaabloydss.com.

2.09 EXIT DEVICES

A. Locking Functions: Functions as defined in BHMA A156.3, and as follows:

B. Manufacturers - Exit Devices:
   1. Von Duprin, an Allegion brand: www.allegion.com/us.

2.10 CLOSERS

A. Closers: Complying with BHMA A156.4.
   1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
   2. Provide a door closer on every exterior door.
   3. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
   4. On pairs of swinging doors, if an overlapping astragal is present, provide coordinator to ensure the leaves close in proper order.
   5. At corridors, locate door-mounted closer on room side of door.

B. Manufacturers - Surface Mounted Closers:
   1. Dorma USA, Inc.

2.11 STOPS AND HOLDERS

A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.

1. Provide floor stops, unless otherwise indicated.
2. If floor stops are not practical, due to configuration of room or furnishings, provide wall stop.
3. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.

B. Manufacturers - Wall and Floor Stops/Holders:
1. Hager Companies: www.hagerco.com.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.12 GASKETING AND THRESHOLDS

A. Thresholds: Complying with BHMA A156.21.
1. Type: Thermally Broken Aluminum
2. Size: 6 " width
3. Finish: Mill Finish Aluminum
4. Accessibility: ADA Compliant
5. At each exterior door, provide a threshold unless otherwise indicated.

B. Manufacturers - Gasketing and Thresholds:
1. Hager Companies: www.hagerco.com.

2.13 FIRE DEPARTMENT LOCK BOX

A. Fire Department Lock Box: Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
1. Capacity: Holds 2 keys.
2. Finish: Manufacturer's standard dark bronze.
3. Manufacturers - Fire Department Lock Box:
a. Knox Company; Knox-Box Rapid Entry System: www.knoxbox.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

D. Mounting heights for hardware from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Sets Schedule or on drawings.

E. Set exterior door thresholds with full-width bead of elastomeric sealant on each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 ADJUSTING

A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

3.04 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

END OF SECTION

SECTION 09 2117
GYPSUM BOARD

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Gypsum wallboard.

D. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2015.

B. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board 2004 (Reapproved 2014).

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2012.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2013.

E. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base 2014a.

F. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2014.

G. GA-216 - Application and Finishing of Gypsum Board 2013.

H. UL (FRD) - Fire Resistance Directory current edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire Rated Partitions 2 HR: UL listed assembly No. U301; 2 hour rating
   2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Marino: www.marinoware.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: C-shaped with knurled or embossed faces.
   2. Runners: U shaped, sized to match studs.
   3. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
   4. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
      a. Products:
         1) Same manufacturer as other framing materials.

C. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com.

B. Gypsum Wallboard: 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: 1/2" and 5/8" (see drawings)
      a. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
   3. Glass Mat Faced Products:
      a. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
      b. National Gypsum Company; Gold Bond eXP Interior Extreme Gypsum Panel: www.nationalgypsum.com/#sle.
      c. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.04 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 1/2 inch.

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic or galvanized steel, unless noted otherwise.

C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
   2. Joint Compound: Setting type, field-mixed.

D. Screws for Attachment to Wood Members: ASTM C514.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.

B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.
   1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
   2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Studs: Space studs as indicated.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

C. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

D. Blocking: Install wood blocking for support of:

1. Framed openings.
2. Wall-mounted cabinets.
3. Toilet accessories.
4. Wall-mounted door hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.05 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. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

C. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:
   1. Single-Layer Applications: Screw attachment.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.07 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   3. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. 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.

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. Coated glass mat backer board as tile substrate.

D. Stone thresholds.

1.02 REFERENCE STANDARDS

A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar 2014.

B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).

C. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement 1999 (Reaffirmed 2010).

D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship 2019.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive 2009 (Revised).

F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy 1999 (Reaffirmed 2010).

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout 1999 (Reaffirmed 2010).

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout 1999 (Reaffirmed 2010).

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework 1999 (Reaffirmed 2010).

K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2010 (Reaffirmed 2016).

L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior glue plywood) Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).

M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone 2005 (Reaffirmed 2010).

N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar 2017.

O. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar 2012 (Revised).

P. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation 2010 (Revised).

Q. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2013.

R. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation 2015.

1.03 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.

1.04 QUALITY ASSURANCE

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.06 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. Porcelain Tile, Type TL-1: Best Tile, Appian Stones
   1. Size: 8 by 16, nominal.
   2. Thickness: 10 mm
   3. Surface Finish: Matte glazed.
   4. Color(s): White.

B. Porcelain Tile, Type TL-2: Best Tile, Appian Stones
   1. Size: 8 by 8 inch, nominal.
   2. Thickness: 10 mm
   3. Surface Finish: Matte glazed.
   4. Color(s): Black.

C. Porcelain Tile, Type TL-3: Best Tile, Appian Stones
   1. Size: 12 by 12 inch, nominal. Basketweave mosaic
   2. Thickness: 10 mm
   3. Surface Finish: Matte glazed.
   4. Color(s): As indicated on drawings.

D. Porcelain Tile, Type TL-4: Best Tile, Appian Stones
   1. Size: 2.5 by 16 inch, nominal. Bullnose
   2. Thickness: 10 mm
   3. Surface Finish: Matte glazed.
   4. Color(s): White.

E. Porcelain Tile, Type TL-5: Nemo, Industry Lavagna Matte Penny
   1. Size: 12 by 12 inch, nominal.
   2. Thickness: 8.5 mm
   3. Surface Finish: Matte glazed.
   4. Color(s): Lavagna.

F. Porcelain Tile, Type TL-6: Best Tile, Watered Silk
   1. Size: 12 by 24 inch, nominal.
   2. Surface Finish: Matte glazed.
   3. Color(s): Grigio.

G. Porcelain Tile, Type TB-1: Best Tile, Appian Stones
   1. Size: 2.5 by 16 inch, nominal.
   2. Color(s): White.

H. Porcelain Tile, Type TB-2: Best Tile, Watered Silk
   1. Size: 2.75 by 24 inch, nominal.

2. Color(s): Grigio.

2.02 TRIM AND ACCESSORIES

2.03 SETTING MATERIALS

A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.

2.04 GROUTS

A. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
   3. Color(s): As indicated on drawings.

B. Stain Resistant Grout Additive: Liquid admixture for sanded and unsanded cement-based grouts; mix with dry grout material in place of water.
   1. Applications: All grouted areas.
   2. Products:
      a. AquaTight Grout additive.
      b. Mapei Grout Maximizer.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.05 MAINTENANCE MATERIALS

A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
   1. Composition: Water-based colorless silicone.

2.06 ACCESSORY MATERIALS

A. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.

B. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. 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 tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install thresholds where indicated.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over wood substrate with backer board underlayment, install in accordance with TCNA (HB) Method F144, for cementitious backer boards, with standard grout.

3.05 INSTALLATION - WALL TILE

A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

3.06 CLEANING

A. Clean tile and grout surfaces.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

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 E1264 - Standard Classification for Acoustical Ceiling Products 2014.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.

1.05 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.06 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 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. CertainTeed Corporation: www.certainteed.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Suspension Systems:
   1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

A. Acoustical Panels, Type ACT-1: Painted mineral fiber, with the following characteristics:
   1. Classification: ASTM E1264 Type III.
   2. Size: 24 by 24 inches.
   3. Thickness: 7/8 inches.
   4. Panel Edge: Beveled Tegular.
   5. Suspension System: Exposed grid.
   6. Products:
      a. CertainTeed; Sand Micro, Narrow Reveal Corner Bevel:www.certainteed.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Acoustical Panels, Type ACT-2: Painted mineral fiber, with the following characteristics:

1. Classification: ASTM E1264 Type III.
2. Size: 24 by 48 inch.
3. Thickness: 3/4 inch.
4. Panel Edge: Bevel Tegular.
5. Suspension System: Exposed grid.
6. Products:
    a. CertainTeed; Sand Micro, Narrow Reveal Corner Bevel: www.certainteed.com.
    b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SUSPENSION SYSTEM(S)

A. 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.

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.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
    1. Profile: Tee; 9/16 inch wide face.
    2. Products:
        a. CertainTeed; www.certainteed.com.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.

D. 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. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

B. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
    1. Use longest practical lengths.

C. 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.

D. 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.

E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

F. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

G. Do not eccentrically load system or induce rotation of runners.

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 acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

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.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile/Plank flooring.

C. Resilient base.

D. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile 2004 (Reapproved 2014).

B. ASTM F1859 - Standard Specification for Rubber Sheet Floor Covering Without Backing 2014.

C. ASTM F1861 - Standard Specification for Resilient Wall Base 2008 (Reapproved 2012).

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 Architect's initial selection.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

D. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

A. 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

A. Rubber Sheet Flooring - Type RF-1: 100 percent rubber composition, color and pattern through total thickness.
   1. Minimum Requirements: Comply with ASTM F1859, Type 1, without backing.
   2. Thickness: 0.125 inch minimum.
   3. Sheet Width: 72 inch minimum.
   4. Pattern: Pathways.
   5. Color: As indicated on drawings.

2.02 LVP FLOORING ALTERNATE # 1 AND #2

A. Luxury Vinyl Tile: LVP-1, LVP-2.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
   2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   3. Size: 6" x 48".
   4. Wear Layer Thickness: .5 mm

5. VOC Content Limits: As specified in Section 01 6116.
6. Thickness: 3 mm
7. Style Name: Latitude.
8. Colors: LVP-1 Color: Ash, LVP-2 Color: Balanced Pine.

2.03 RESILIENT BASE

A. Resilient Base WB-3, WB-4: ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company; Millwork Wall Finishing System: www.johnsonite.com/#sle.
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648, NFPA 253, ASTM E 648, or NFPA 253.
   3. Height: 6 inch.
   4. Thickness: 0.125 inch.
   5. Finish: Satin.
   6. Length: Roll.
   7. Color: TBD.

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. 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 PREPARATION

A. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

3.04 INSTALLATION - SHEET FLOORING

A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.

3.05 INSTALLATION - LVP FLOORING

A. Mix LVP from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Install plank tile with a random offset of at least 6 inches from adjacent rows.

3.06 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.07 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Mechanical and Electrical:
      a. In finished areas, paint conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, and sprinkler lines, unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise 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. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials 2007.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition, www.paintinfo.com.

C. Green Seal GS-11 - Paints, Coatings, Stains, and Sealers; 2015

D. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113 current edition.

E. SSPC-SP 1 - Solvent Cleaning 2015.

F. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of 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.

1.04 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 6 feet long by 6 feet wide, illustrating paint color, texture, and finish at refinished floor and ceiling transparent finishes.

1.05 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.

1.06 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect 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.

B. Paints:
   1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes 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 paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
   1. Two top coats and one coat primer.
   2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
      a. Products:
         1) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
         2) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141) **(at Wood trim)**

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
   1. Two top coats and one coat primer.
   2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
      a. Products:
         1) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.

C. Paint I-TR -W - Transparent Finish on Wood.
   1. 2 top coats, no stain.

D. Paint GI-OP-2L - Gypsum Board/Plaster, Latex, 2 Coat:
   1. One coat of alkyd primer sealer.
   2. Eggshell: One coat of latex enamel.

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 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 is below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

F. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

G. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

H. Galvanized Surfaces:

I. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: 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. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

J. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 SCHEDULE - PAINT SYSTEMS

A. See Finish Schedule on Drawing A8.7

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash allowance for signs.

B. Room and door signs.

C. Residential Unit Doors

D. Interior directional and informational signs.

E. Building identification signs.

1.02 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2100 - Allowances, for cash allowances affecting this section.

B. Allowance amount covers purchase, delivery, and installation.

1.03 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.

1.04 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.

1.05 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 VENDOR

A. Expose Signs & Graphics Inc.; 13 Airport Road, Hopedale MA 01747

B. Contact: Andy Clark 1-508-351-0941

2.02 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, 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: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
   6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.

7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille.

C. Building Identification Signs:
1. Use individual metal letters.
2. Mount on main entrance canopy.

2.03 SIGN TYPES

A. Flat Signs: Signage media without frame.
1. Edges: Square.
2. Corners: Square.
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. Character Color: Black 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 DIMENSIONAL LETTERS

A. Metal Letters:
1. Metal: Aluminum casting.
2. Letter Height: 8 inches.
3. Text and Typeface:
a. Character Font: Helvetica, Arial, or other sans serif font.
b. Character Case: Upper case only.
4. Mounting: Concealed screws.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Residential toilet, shower, and bath accessories.

B. Under-lavatory pipe supply covers.

C. Accessories for toilet rooms, showers, and residential bathrooms.

D. Electric hand/hair dryers.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

C. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium 2011.

D. ASTM C1036 - Standard Specification for Flat Glass 2011.

E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror 2008 (Reapproved 2013).

1.03 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.

1.04 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 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.

B. Stainless Steel Sheet: ASTM A666, Type 304.

C. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.02 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

2.03 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, stainless steel, eccentric-shaped plastic spindle for 1/2 revolution delivery designed to prevent theft of tissue roll.
   1. Products:
      a. Bobrick Washroom Equipment, Inc.; TrimLine Series, Model B-3588, Finish: Matte Black: www.bobrick.com.
      b. Substitutions: Section 01 6000 - Product Requirements.

B. Waste Receptacle: Wall-mounted, stainless steel, seamless lower door for access to container, reinforced panel full height of door, continuously welded bottom pan and seamless exposed flanges.
   1. Liner: Removable, heavy-duty vinyl liner, attached at a minimum of four points with stainless steel grommets and hooks.

2. Minimum capacity: 6 gallons.
3. Products:
   a. Bobrick Washroom Equipment, Inc.; Fino Collection, Model B-9279, Finish: Matte Black: www.bobrick.com.
   b. Substitutions: Section 01 6000 - Product Requirements.

C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with black cover and horizontal black tank and working parts; push type soap valve, check valve, and window gauge refill indicator.
1. Minimum Capacity: 40 ounces.
2. Products:
   a. Bobrick Washroom Equipment, Inc.; B-42: www.bobrick.com.

D. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
1. Size: 24x36.
2. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
3. Products:
   a. Bobrick Washroom Equipment, Inc.; B-290 Series, Finish: Matte Black: www.bobrick.com.
   b. Substitutions: Section 01 6000 - Product Requirements.

E. Seat Cover Dispenser: Stainless steel, surface-mounted, reloading by concealed opening at base.
1. Minimum capacity: 250 seat covers.
2. Products:
   a. Bobrick Washroom Equipment, Inc.; Classic Series, Model B-221, Finish: Matte Black: www.bobrick.com.
   b. Substitutions: Section 01 6000 - Product Requirements.

F. Grab Bars: Stainless steel, nonslip grasping surface finish. **ADA Units.**
1. Standard Duty Grab Bars:
   a. Push/Pull Point Load: 250 pound-force, minimum.
   b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
   c. Length and Configuration: As indicated on drawings.
   d. Products:
      1) Bobrick Washroom Equipment, Inc.; Fino Collection, B-9806 Series: www.bobrick.com.
      2) Substitutions: Section 01 6000 - Product Requirements.

2.04 COMMERCIAL SHOWER AND BATH ACCESSORIES

2.05 RESIDENTIAL TOILET, SHOWER, AND BATH ACCESSORIES

A. Medicine Cabinet: Frameless recessed wall cabinet.
1. Manufacturer: WG Wood Products
2. Style: FR-224 Shaker Style
3. Color: White

B. Mirrors: Beveled Edge, 1/4 inch thick annealed float glass; ASTM C1036.
1. Sizes: 30" x 36", 48" x 36", 60" x 36" (Based on vanity size)

C. Toilet Paper Holder: Surface mounted, single roll, concealed attachment.
1. Material: Stainless steel; matte black finish.
2. Products:
   a. Manuf. / Model #Pioneer Faucets 7MO032MB.
   b. Color: Matte Black.

D. 18" Towel Bar: Round tubular bar; rectangular mounting posts, concealed attachment.
1. Products:
   a. Manuf. / Model #Pioneer Faucets 7MO031MB.

b. Color: Matte Black.

E. 24" Towel Bar: Round tubular bar; rectangular mounting posts, concealed attachment.
1. Products:
a. Manuf. / Model #Pioneer Faucets 7MO030MB.
b. Color: Matte Black.

F. Towel Ring: Post with hanging ring, concealed attachment.
1. Products:
a. Manuf. / Model #Pioneer Faucets 7MO034MB.
b. Color: Matte Black.

G. Shower Curtain Rod: Straight tube, 1 inch diameter, with mounting flanges for concealed attachment.
1. Products:
a. Manuf. / Model #Moen, CSR2160BL .
b. Color: Matte Black.

H. Robe Hook: Single-prong, concealed attachment.
1. Products:
a. Manuf. / Model #Pioneer Faucets 7MO033MB.
b. Color: Matte Black.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Under-Lavatory Pipe and Supply Covers:
1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
3. Construction: 1/8 inch flexible PVC.
4. Color: White.
5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.

2.07 ELECTRIC HAND/HAIR DRYERS

A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
1. Operation: Automatic, sensor-operated on and off.
2. Mounting: Surface mounted.
3. Cover: Plastic.
a. Color: White.
b. Tamper-resistant screw attachment of cover to mounting plate.
4. Electric Hand Dryer Products:
a. Excel Dryer Inc; ThinAir Hand Dryer: www.exceldryer.com/#sle.

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.

B. Provide templates and rough-in measurements as required.

3.03 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.

D. Mounting Heights and Locations: as indicated on drawings and as follows:

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.02 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Kidde, a unit of United Technologies Corp: www.kidde.com.
   2. Amerex
   3. Pyro-Chem, a Tyco Business: www.pyrochem.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Class: A:B:C type.
   2. Size: 5 pound.
   3. Finish: Baked polyester powder coat, Red color.

2.03 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction: Non-fire rated.
   1. Formed primed steel sheet; 0.036 inch thick base metal.

B. Cabinet Configuration: Semi-recessed type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Place extinguishers on wall brackets.

3.02 SCHEDULES

A. Provide Five (5) extinguishers.

END OF SECTION

SECTION 10 5113
METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lockers.

B. Locker benches.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. 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 published data on locker construction, sizes, and accessories.

C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.

D. Samples: Submit two samples 3 by 6 inches in size showing color and finish of metal locker material.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Lockers:
   1. ASI Storage Solutions: www.asi-storage.com/#sle.
   2. Lockers MFG: www.lockersmfg.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LOCKER APPLICATIONS

A. Wardrobe Lockers: Metal lockers, wall mounted with matching closed base.
   1. Width: 12 inches.
   2. Depth: 15 inches.
   3. Configuration: Single tier.
   4. Fittings: Size and configuration as indicated on drawings.
   5. Ventilation: Louvers at top and bottom of door panel.
   6. Locking: Padlock hasps, for padlocks provided by Owner.
   7. Color: To be selected from manufacturer's full range by Architect.

2.03 METAL LOCKERS

A. Accessibility: Design units indicated on drawings as 'accessible' to comply with ICC A117.1 and ADA Standards.

B. Locker Case Construction:
   1. Heavy-Duty, Welded Construction: Made of formed and welded together sheet steel; metal edges finished smooth without burrs; baked enamel or powder coat finished inside and out.

C. Doors: Channel edge; welded construction, manufacturer's standard stiffeners, grind and finish edges smooth.
   1. Door Thickness: 16 gauge, 0.0598 inch, minimum.
   2. Form recess for operating handle and locking device.

D. Latches and Door Handles: Manufacturer's standard.

E. 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.

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. Install fittings if not factory installed.

E. Replace components that do not operate smoothly.

3.03 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 12 2400
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Window shades and accessories.

1.02 REFERENCE STANDARDS

A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2015.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken.
   2. Do not install shades until final surface finishes and painting are complete.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings: Include shade schedule indicating size, location and keys to details.

D. Selection Samples: Include fabric samples in full range of available colors and patterns.

1.05 MOCK-UP

A. Mock-Up: Provide full size mock-up of window shade complete with selected shade fabric including sample of seam when applicable.
   1. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
   2. Full-sized mock-up may become part of the final installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.07 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

A. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: One year.
   2. Fabric: One year.
   3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior Manually Operated Roller Shades:
   1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.
   2. Hunter Douglas Architectural; RB500 Manual Roller Shades: www.hunterdouglasarchitectural.com/#sle.

2.02 WINDOW SHADE APPLICATIONS

A. Interior Roller Shades: Translucent shades.
   1. Type: Roll down, closed position is at window sill.
   2. Color: As selected by Architect from manufacturer’s full range of colors.
   3. Mounting: Inside (between jambs).

2.03 ROLLER SHADES

A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories.

B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   1. Translucent Shades: Soften the light and reveal only shadow-like outlines to the outside; substantial privacy; Openness Factor less than 1 percent.
   2. Flammability: Pass NFPA 701 large and small tests.

C. Roller Tubes: As required for type of operation.

D. Hembars: Designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.

E. Manual Operation for Interior Shades: Clutch operated continuous loop; beaded ball chain.

2.04 ACCESSORIES

A. Fascias: Size as required to conceal shade mounting.

B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.

C. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.05 FABRICATION

A. Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window sill.
   2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Installation Tolerances:
   1. Maximum Offset From Level: 1/16 inch.

C. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.02 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

C. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

3.03 CLOSEOUT ACTIVITIES

3.04 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 3200
MANUFACTURED WOOD CASEWORK

PART 2 PRODUCTS

1.01 CASEWORK, GENERAL

A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

1.02 FABRICATION

A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.

B. Construction: As required for selected grade.

C. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

END OF SECTION

SECTION 13 3419
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame.

B. Insulated Metal wall and roof panels including soffits, gutters and downspouts, and roof mounted equipment curbs.

C. Exterior doors, windows, skylights, overhead doors, and louvers.

1.02 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings 2010.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2009.

D. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality 2014.

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 C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2014.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2015a.

H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2014.

I. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2007a.

J. 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.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015.

1.03 DESIGN REQUIREMENTS

A. Installed Thermal Resistance of Wall System: R value of R13 +R13 Continuous.

B. Installed Thermal Resistance of Roof System: R value of R19 + R11 Liner System.

C. Design members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.

D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

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 profiles, component dimensions, fasteners.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

D. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
   1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
   2. Comply with applicable code for submission of design calculations as required for acquiring permits.

B. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
   1. Not less than 10 years of documented experience.

1.07 WARRANTY

A. Provide five year manufacturer warranty for Metal Building.
   1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Buildings Systems:
   1. Butler Manufacturing Company: www.butlermfg.com/#sle.
   2. Ceco Building Systems: www.cecobuildings.com/#sle.
   3. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ASSEMBLIES

A. Single span rigid frame.

B. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, and wind bracing.

C. Secondary Framing: Purlins, and other items detailed.

D. Wall System: Preformed metal panels of horizontal profile, with sub-girt framing/anchorage assembly, and accessory components.

E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.

F. Roof Slope: 4.5 inches in 12 inches.

2.03 PERFORMANCE REQUIREMENTS

A. Installed Thermal Resistance of Wall System: R-value of R13 + R13 Continuous.

B. Installed Thermal Resistance of Roof System: R-value of R-19 + R11 Liner System.

C. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

D. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of ____ degrees F.

2.04 MATERIALS - FRAMING

A. Structural Steel Members: ASTM A36/A36M.

B. Plate or Bar Stock: ASTM A529/A529M, Grade 50.

C. Anchor Bolts: ASTM F1554, Grade 36, Class 1A, with no preference for protective coating.

D. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.

E. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.

F. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

2.05 MATERIALS - WALLS AND ROOF

A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Designation SS (structural steel), Grade 33 (230), with G90/Z275 coating.

B. Insulation: Manufacturter's standard to meet performance specifications

C. Metal Building Type, Factory Applied, Vapor-Barrier Insulation Facings: Water vapor permeance no greater than 0.10 perm when tested in accordance with ASTM E96/E96M; flame spread index of 25 or less, and smoke developed index of 40 or less when tested in accordance with ASTM E84.

D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.

2.06 COMPONENTS

2.07 FABRICATION - FRAMING

A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.

B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.

C. Provide wall opening framing for doors, windows, and other accessory components.

2.08 FABRICATION - GUTTERS AND DOWNSPOUTS

A. Fabricate of same material and finish as roofing metal.

B. Form gutters and downspouts of square profile and size to collect and remove water. Fabricate with connection pieces.

C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.

D. Fabricate support straps of same material and finish as roofing metal, color as selected.

2.09 FINISHES

A. Exterior Surfaces of Wall Components and Accessories: Precoated enamel on steel of modified silicone finish, _____ color as selected from manufacturer's standard range.

B. Interior Surfaces of Wall Components and Accessories: Precoated enamel on steel of modified silicone finish, _____ color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.02 ERECTION - FRAMING

A. Erect framing in accordance with AISC 360.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION - WALL AND ROOF PANELS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.

E. Provide expansion joints where indicated.

F. Use concealed fasteners.

G. Install sealant and gaskets, providing weather tight installation.

3.04 ERECTION - GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

B. Slope gutters minimum ____ inch/ft.

C. Install splash pans under each downspout.

END OF SECTION

SECTION 22 0000
PLUMBING REQUIREMENTS

PART I -- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

B. Bidders shall utilize a complete set of Bidding Documents in preparing of Bid including Drawings and Specifications. The Engineer assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 DEFINITIONS

A. As used in the drawings and specifications for plumbing work, certain non-technical words shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions of other documents governing the plumbing work.

B. As used in this section, “provide” means “furnish and install”, and “POS” means “Provided under Other Sections”.

C. "Approved Equal" means any equipment or material, which is approved by the engineer, and equal in quality, durability, appearance, strength, design and performance to the equipment or material originally specified.

D. "Alternate" means an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

E. "Concealed" means hidden in chases, furred spaces, walls, above ceilings or enclosed in construction.

F. "Contractor and/or Subcontractor" specifically means, the Plumbing Subcontractor working under this Section of the Specification.

G. "Exposed" means visible, in sight, or not installed "concealed" as defined above.

H. “Furnish” or “Provide” means:

1. Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the plumbing work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased item(s) are free of all liens, claims, or encumbrances.

2. To supply, erect, install and connect in complete readiness for operation, the particular work referred to, unless otherwise specified.

I. “Install” means: Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the plumbing work.

J. "May" means: A permissive term.

K. “New” means: Manufactured within the past two (2) years and never before used.

L. "Piping" means all piping including fittings, joints, hangers, supports and valves.

M. “Provide” means: “Furnish” and “Install”.

N. "Shall" means: A mandatory term.

O. "Underground or Below Slab" means piping that is buried exterior to or within the building.

P. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any plumbing item in the drawings or specifications for plumbing work carries with it the instruction to furnish, install and connect the item as part of the plumbing work, regardless of whether or not this instruction is explicitly stated.

Q. It shall be understood that the specifications and drawings for plumbing work are complimentary and are to be taken together for a complete interpretation of the plumbing work except that indications on the drawings, which refer to an individual element of work, take precedence over the specifications where they conflict with same.

1.3 SUMMARY

A. This section addresses materials and methods common to more than one Subcontractor. Refer to the drawings to determine the extent of work required of each individual trade.

1.4 DESCRIPTION OF WORK

A. The work described herein shall be interpreted as work to be done by the Plumbing Subcontractor. Work to be performed by other trades will be specifically referenced to a particular Contractor or Subcontractor.

B. The work under this section shall consist of furnishing all labor, materials, equipment, supervision, transportation, construction, facilities, devices and incidentals necessary to provide complete plumbing systems as hereinafter described and as indicated on the

drawings, including, but not limited to the following:

1. Domestic cold water system.
2. Domestic hot water supply system.
3. Emergency Shower and Eyewash
4. Propane fired and electric heat pump water heaters
5. Sanitary, waste and vent system. Double wall below slab waste piping from floor drains in garage.
6. Propane gas system.
   This system shall extend from the bulk propane tank to the exterior 2nd stage regulator into the building and supply the propane fired appliances.
7. Coordination drawings.
8. As of January 4, 2014; all products associated with any plumbing system utilized to convey potable drinking water shall comply with the Reduction of Lead in Drinking Water Act.

1.5 RELATED WORK IN OTHER SECTIONS

A. The following work is not included as work in this Section and is to be performed under other Sections:

1. Heating, Ventilating and Air Conditioning
2. Foundations and Trenching
3. Electrical
4. Utilities Beyond 5’-0” from the Building
5. Excavation and Backfilling
6. Temporary Light and Power
7. Temporary Water, Heat, Fire Protection and Toilet Facilities
8. Concrete Bases for Equipment
9. Installation of Access Panels
10. Flashing and Caulking
11. All Cutting and Patching

12. Painting

13. Toilet Room Accessories

14. Design and installation of below slab radon system beneath the building slab.

1.6 CODES, ORDINANCES AND PERMITS

A. All materials and workmanship shall comply with the latest editions of all applicable Codes, Local and State Ordinances, Industry Standards and Regulations.

B. Where the contract documents indicate more stringent requirements than the following codes and ordinances, the contract documents shall take precedence.

C. In the event of a conflict with Codes, the most stringent requirements shall apply.

D. The Plumbing Subcontractor shall notify the Architect/Engineer of any discrepancies between the Contract Documents and applicable Codes, Standards, etc.

E. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section.

F. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings, in addition to contract drawings and documents in order to comply with all applicable local ordinances and regulations, whether or not shown on drawings and/or specified.

G. The following Codes, Standards and References shall be utilized as applicable:

1. 2019 International Building Code
2. 2019 International Plumbing Code
3. 2019 International Fuel Gas Code
4. 2019 International Mechanical Code
5. 2019 International Energy Conservation Code
6. 2019 National Electrical Code (NFPA-70)
7. ICC/ANSI A117.1-2003 Accessible and Usable Buildings and Facilities
8. Local Codes, Ordinances, Board of Health requirements and Regulations.
9. American Gas Association (AGA).
10. American National Standards Institute (ANSI).
11. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
12. American Society of Mechanical Engineers (ASME).
13. American Society of Testing Materials (ASTM).
14. American Welding Society (AWS).
15. Cast Iron Soil Pipe Institute (CISPI)
16. Commercial Standards, U.S. Department of Commerce (CS).
17. Department of Environmental Protection (DEP).
18. Environmental Protection Agency (EPA).
19. Factory Mutual (FM).
20. Industrial Risk Insurers (IRI).
21. Insurance Services Organization (ISO).
22. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS).
23. National Electric Code (NEC).
24. National Electrical Manufacturers Association (NEMA).
25. National Fire Protection Association (NFPA).

26. Occupational Safety and Health Administration (OSHA)
27. Owner's Insurance Company Requirements.
28. State Department of Public Safety.
29. Underwriters' Laboratories, Inc. (UL).

1.7 CONTRACT DRAWINGS AND SPECIFICATIONS

A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before proper execution of the work.

B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.

1.8 OBTAINING INFORMATION

A. Obtain from the manufacturer the proper method of installation and connection of the equipment that is to be furnished and installed. Obtain all information that is necessary to facilitate the work and to complete the project.

1.9 COOPERATION AND COORDINATION WITH OTHER TRADES

A. The Contract Drawings are diagrammatic only intending to indicate general routing and location of piping and equipment. The Drawings are not intended to show every offset and accessory required, nor every structural difficulty that may be encountered.

B. Where requirements of the applicable codes, plans and/or specifications are in conflict, the most stringent requirement will be included in the Contract. Prior to ordering and/or installing any portion of the work which appears to be in conflict, the work shall be brought to the Architect/Engineer's attention for direction as to what is provided.

C. Final location of plumbing fixtures and other pieces of equipment, whether or not furnished by the Plumbing Subcontractor, requiring plumbing services shall be coordinated with the Architectural Plans. Additional offsets, fittings, etc., shall be provided as needed to meet this requirement at no extra cost to the Owner.

D. If discrepancies exist in the scope of work as to what trade provides items, they shall be reported to the Architect/Engineer prior to signing the Contract. If the discrepancies are not

reported, the Plumbing Subcontractor shall furnish such items as needed for a complete and operable system.

E. All work shall be installed in cooperation with other trades.

F. Keep fully informed as to the shape, size and position of all openings required for all apparatus and give information in advance to build openings into the work. Furnish and set in place all sleeves, pockets, supports and incidentals.

G. All distribution systems which require pitch or slope such as plumbing drains, steam and condensate piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.

H. Prepare and submit for review, coordinated Plans and sections, clearly showing how the work is to be installed in relation to the work of other trades. Work that is installed before coordination with other trades, or that causes interference with the work of other trades shall be changed to correct condition.

I. The Plumbing Contractor shall pay for all permits, inspections, labor, material and fees associated with the various Utility Companies coordination requirements mentioned in this section and for this Contractor's work under this project.

J. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structural and other trades and to meet Architectural requirements.

K. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the plumbing work shall interfere with the work of other trades, assist in working out the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owners, make reasonable modifications to the work as required by normal structural interferences. Pay the General Contractor for additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.

L. If any plumbing work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the trades involved without extra cost to the Owners.

M. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect and Engineer for review and approval.

1.10 PROPANE COMPANY COORDINATION

A. This section includes, but is not limited to coordination with the following utilities, agencies and

authorities having jurisdiction:

1. Propane Gas: This Contractor shall coordinate with the local propane gas vendor/supplier and provide all material & labor required to comply with the vendor. Notify Engineer of discrepancies between the plans and the local vendor company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the vendor company, but corrections shall be made. Propane vendor shall be responsible for the design and installation of the bulk propane storage tank and all underground piping up to and including the second stage regulator on building exterior wall.

2. Plumbing Inspector: Review plans and specifications with the local plumbing inspector. Obtain and pay for all permits.

3. Building Inspector: Review plans and specifications with the local building inspector, if not done so by the General Contractor.

4. OSHA Representative: Review plans and specifications with the local OSHA representative, if not done so by the General Contractor.

5. Dig Safe: This contractor shall notify and coordinate with Dig Safe prior to any excavation; digging; trenching; grading; tunneling; augering; boring; drilling; pile driving; plowing-in or pulling-in pipe or other sub-structure; backfilling; demolition; and blasting related to this Contractor.

1.11 BIDDER'S REPRESENTATION

A. By the act of submitting a bid for the proposed contract, the Bidder represents that:

1. The Bidder and all subcontractors have carefully and thoroughly reviewed the drawings, specifications and other construction contract documents and have found them complete and free from ambiguities and sufficient for the purpose intended; further that.

2. The Bidder intends to use are licensed, skilled and experienced in the type of construction represented by the construction contract documents bid upon; further that.

3. Neither the Bidder nor any of the Bidder's employees, agents, intended suppliers or subcontractors have relied upon any verbal representations, allegedly authorized or unauthorized from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that

4. The bid figure is based solely upon the construction contract documents and properly issued written addenda and not upon any other written representation.

1.12 SHOP DRAWINGS

A. Within thirty (30) days after the date of notice to proceed, and before purchasing any materials or equipment, submit for approval a complete itemized list, in six (6) copies, of all materials, equipment and of Subcontractors to be incorporated under this Section.

B. After approval of the list, submit for review a minimum of eight (8) sets of detailed shop drawings. All shop drawings for equipment submitted for review shall include complete Specifications, including type of materials, operating pressures and temperatures, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete for all equipment and shall apply only to this specific project.

C. All shop drawing submittals shall be complete and include all Part 2 – Products of this specification and be clearly identified. No consideration will be given to partial submittals, except with prior approval.

D. Facsimiles of any type will not be accepted.

E. A written letter from the Plumbing Contractor stating all piping systems above and below ground specified herein have been tested, flushed and approved by the Local Plumbing Inspector.

F. Submit a coordinated drawing set in Autocad on a CD to owner.

G. A written letter from the Plumbing Contractor stating all water piping systems above and below ground specified herein have been sterilized, flushed and approved by the Local Plumbing Inspector.

H. A written letter from the Plumbing Contractor stating all gas piping systems specified herein have been tested, purged and approved by the local Plumbing and / or Gas Inspector.

I. Provide test certificates, registration forms, diagrams, plans, details, permits, etc. for all backflow devices, as specified herein with a written cover letter from a certified backflow protection device tester stating that all testable backflow devices have been tested.

J. A written letter, stamped and signed by a Registered Structural Engineer in the State where the building is being built or renovated, confirming that the pipe hanger system meets the state seismic code requirements.

K. A written cover letter, attached to the insulation materials submittals, from the Insulation Contractor stating an outline for all insulating materials furnished and installed for all piping systems specified herein.

L. If foreign materials are used, Engineer shall be informed in writing together with any information about them he requires for approval.

M. Engineering Design Service's reserves the right to request additional submittals on any item not specified herein under this section.

N. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist.

O. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, same shall be provided. Plumbing Subcontractor to assume cost and entire responsibility thereof.

P. Regardless of any information included in the shop drawing submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the shop drawing review.

Q. Each submittal shall be reviewed, stamped and certified prior to submission to the Architect. Such certification shall be made by the Owner, or Corporate Officer of the Contractor, or by a person duly authorized by the Owner to sign binding agreements for the Contractor. The certification shall state that data and details contained on each shop drawing, layout drawing, catalog data and brochure has been reviewed by the Contractor and that it complies with the Contract Documents in all respects. Shop drawings, layout drawings, catalog data and brochures will not be reviewed and will be returned to the Contractor unchecked unless they are certified.

R. Refer to section 013300 to section 016000 for additional submittal and product data requirements.

S. It is intended that the Contractor submit complete and accurate data at the first submission. If the shop drawing is returned marked “Does not Conform”, or “Resubmit for Final Review”, only one (1) additional submission will be permitted.

T. Equipment shall be of proper size for its allotted space. Equipment shall be disassembled as required, without invalidating the manufacturer’s warranty, so that it can be installed through regular window, door and/or louver openings.

U. The shop drawings and manufacturer’s data shall be submitted in a timely manner sufficiently in advance to give ample time for checking, correcting, resubmitting and rechecking if necessary. No claim for delay will be granted for failure to comply with this requirement.

V. A minimum period of two (2) weeks, exclusive of transmittal time, will be required in the Engineer’s office each time shop drawings, layout drawings and catalog data and brochures are submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling his work.

1.13 EXCAVATION AND BACKFILL

A. Pipe bedding shall be in accordance with provisions of sections on excavation and backfill. Work under this section shall commence only after proper bedding material has been provided, graded and properly compacted. Excavation shall be kept open until system has been inspected, tested and approved.

B. The Plumbing Contractor shall observe all excavation, backfilling and compaction of all underground piping associated with work under this section.

1.14 RECORD DRAWINGS

A. All costs related to the following requirements shall be paid for by this Subcontractor.

B. Purchase and maintain at the job site a complete and separate black line set of prints of the Contract Drawings on which accurately indicate daily progress by coloring materials and apparatus as installed. Schedules shall be modified to reflect data consistent with that of the installed equipment. Clearly show all changes to the work as a result of change orders, instructions issued by the Architect or conditions encountered in the field. Accurately indicate the location, size, type and elevation of new utilities and their relationship to existing utilities.

C. The marked up and colored in prints will be used as a guide for determining the progress of the work installed. They shall be inspected weekly and shall be corrected immediately if found

inaccurate or incomplete. Requisitions for payment will not be approved until the Drawings are accurate and up-to-date.

D. At the completion of the work, submit one (1) set of marked up prints for review and comment. After review and comment, these marked up prints shall be used in the preparation of the Record Drawings. The Record Drawings shall consist of these prints (corrected) previously indicated, as well as two (2) CAD disks of the Final Coordination Drawings, corrected on the basis of the Architect/Engineer's final comments.

E. Obtain and pay for one (1) set of reproducible mylars and CAD disks (AutoCAD Release 2000 minimum or compatible system) applicable to this Section. Make all modifications to these reproducibles as shown on the marked up prints. Remove all superseded data to show the completed installation.

F. The Record Drawings may be made from the originals of the Contract Drawings. Arrange with the Architect to have these reproducibles made from the originals.

G. Deliver the completed reproducible Record Drawings and CAD disks properly titled and dated to the Architect. These Record Drawings shall become the property of the Owner.

1.15 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems installed. The cost of such instructions, up to one full day of the Contractor's time, shall be included in the contract price. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the Contract Price. Included shall be a letter with two (2) copies containing the name of the person or persons to whom the instructions were given and the dates of the instruction period shall be submitted to the Architect at the completion of the project.

B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders containing only that information which specifically applies to this project and all unrelated material shall be deleted, indexed, containing the following:

1. Complete shop drawings of all material and equipment in Part 2 of this section.
2. Operation descriptions of all systems.
3. Provide name, address and telephone number of the manufacturer's representative and service company for each piece of equipment so that the source of replacement parts and service for each item of equipment can be readily obtainable.
4. Preventative maintenance instructions for all systems.
5. Spare parts list of all system components.
6. Copies of all valve charts.
7. During the instruction period this manual shall be used and explained.

1.16 GUARANTEE

A. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of five (5) year minimum from the date of acceptance or final payment.

B. Any failure due to defective material, equipment or workmanship which may develop shall be corrected at no expense to the Owner, including all damage to areas, materials and other systems resulting from such failures.

C. Upon receipt of notice from the Owner of failure of any part of the systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.17 STORAGE OF MATERIALS

A. Store materials prior to their installation where designated by the General Contractor. This Contractor shall be responsible for all materials stored and protect all installed equipment from injury or defacement.

1.18 PROTECTION OF WORK AND PROPERTY

A. Be responsible for the care and protection of all work included under this Section until it has been tested and accepted.

B. Protect all equipment and materials from damage from all causes including theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment.

C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen and make good damage thus caused.

D. When open flame or spark producing tools such as blow torches, welding equipment, etc., are required in the process of executing the work, the General Contractor will be notified not less than twenty-four (24) hours in advance of the time that the work is to begin and the location where the work is to be performed. Provide, where necessary, fire protective covering and maintain a constant non-working fire watch where work is being performed and until it is completed.

1.19 COOPERATION WITH OTHER TRADES

A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. Coordination drawings shall be initiated and provided as part of this Specification. It is their responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under this section of the Specifications. These drawings shall be prepared at not less than 3/8 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections 230000, 260000 and 210000, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted. After this Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each

drawing has been coordinated between trades, each trade shall sign each drawing, indicating acceptance of the installation. The HVAC Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings.

C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

D. The Coordination Drawings shall be produced on AutoCAD Release 2006 minimum or compatible system. A disc and one (1) set of PDF drawings shall be provided to the Architect/Engineer for review.

E. The cost of preparing and reproducing these Drawings will be included as part of this Contract.

F. Coordination Drawings shall not be construed as replacing any Shop Drawings.

G. The Plumbing Subcontractor shall be additionally responsible for preparing drawings indicating all the buried or underground plumbing systems. Include in these documents all other underground components such as, but not limited to, underslab drainage systems, foundation drainage systems, footings, foundation walls, pits, tie beams, electric and telephone duct banks.

1.20 CONTINUITY OF SERVICE AND SCHEDULING OF WORK

A. Continuity of all services shall be maintained in all areas which will be occupied during the construction period. When an interruption of service becomes necessary, such shall be made only upon consent of the Owner and at a time outside normal working hours as he shall designate.

B. Refer to the overall scheduling of the work of the project. Schedule work to conform to this schedule and install work to not delay nor interfere with the progress of the project.

1.21 SUBSTANTIAL COMPLETION

A. When Subcontractor considers Work under this Section (or designated portion of Work) is substantially complete, submit written notice through the General Contractor with a list of items remaining to be completed or corrected.

B. Should Architect and/or his Engineer observe and find Work is not substantially complete, he will promptly notify Subcontractor through the General Contractor in writing, listing observed deficiencies.

C. Subcontractor shall remedy deficiencies and send a second written notice of substantial completion.

D. When Architect and/or his Engineer finds work is substantially complete he will prepare a Certificate of Substantial Completion in accordance with provisions of General Conditions.

1.22 FINAL COMPLETION

A. When Subcontractor considers Work under this Section is complete, submit through the General Contractor written certification that:

1. Contract documents have been reviewed.
2. Work has been inspected for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents and deficiencies listed with Certificate of Substantial Completion have been corrected.
4. Equipment and systems have been tested, adjusted and balanced and are fully operational.
5. Operation of systems has been demonstrated to Owner's personnel.
6. Work is complete and ready for Architect's and/or his Engineer's final review.
7. Should Architect and/or his Engineer observe and find work incomplete, he will promptly suspend his review and notify Subcontractor in writing through the General Contractor.
8. Subcontractor shall complete his work, remedy deficiencies and send a second certification of final completion.
9. Architect and/or his Engineer shall, upon receipt of a second certification of completion, make a second review and shall notify the Subcontractor in writing through the General Contractor listing observed deficiencies.
10. When Architect and/or his Engineer finds work complete, he will consider close out submittals.

1.23 REOBSERVATION

A. Should status of completion of Work require additional services by Architect and/or his Engineer due to failure of Work to conform with Subcontractor's claims on initial Architect and/or Engineer's review for Substantial Completion or for Final Completion, Owner will deduct the amount of Architect and/or his Engineer's compensation for additional services from final payment to Subcontractor.

1.24 CERTIFICATES OF APPROVAL

A. Upon completion of all work, furnish in duplicate certificates of inspections from all inspectors and authorities having jurisdiction, notarized letters from the manufacturers stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be in satisfactory operating condition.

1.25 INSPECTION AND TEST

A. If inspection of materials and/or equipment installed shows defects, such defective materials and/or equipment shall be replaced at no cost to the General Contractor or Owner, and the inspection and tests repeated.

B. Make all reasonable tests as required, and prove the integrity of all work and leave the entire installation in correct adjustment and ready to operate.

1.26 MATERIALS AND EQUIPMENT STANDARDS

A. Where materials or equipment are specified by patent proprietary name or name of the manufacturer, such specification shall be deemed to be used for the purpose of establishing a

standard for that particular item. No equipment or material shall be used unless previously approved by the Architect.

B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified and only if the term “approved equal” appears. The request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process.

C. If a substitution of materials or equipment in whole or in part is made, the Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.

D. Manufacturer’s directions shall be followed in the delivery, storage and installation of any equipment. Notify the Architect/Engineer, in writing, of any conflict between the Contract Drawings and the manufacturer’s requirements and obtain a written response prior to proceeding with work. Should the Subcontractor fail to comply with this, he/she shall bear the costs of any corrections which may be required.

E. The Subcontractor shall furnish and install all equipment, accessories, connections and incidentals to complete the work under this Section.

F. As of January 4, 2014; all products installed associated with any plumbing system utilized to convey potable drinking water shall comply with the Reduction of Lead in Drinking Water Act.

1.27 CONFLICT BETWEEN PLANS AND SPECIFICATIONS

A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.

PART 2 -- PRODUCTS

2.1 PIPE AND FITTINGS

A. Pipe and fittings shall be of US manufacture and shall conform to the latest ANSI, ASTM, AWWA and NFPA Standards including latest amendments.

B. Each length of pipe, each pipe fitting, trap, material and/or device used in the respective system shall have cast, stamped or indelibly marked on it, the maker's name or mark, weight and quality of the product when such marking is required by the approved standard that applies.

C. Type A:
Type K soft annealed rolled copper tubing, one (1) piece with no joints between the connection to the exterior water supply and the first fitting within the building. Fittings shall be wrought copper joined with a silver brazing filler.

D. Type B:
Cross Linked Polyethylene (PEX) tubing and compatible fittings from the same manufacturer. Tubing and fittings shall be installed in accordance with manufacturer’s installation procedures.

E. Type C:
PVC Schedule 40 solid wall pipe and PVC drainage fittings joined by solvent welding.

PVC cellular core pipe and PVC drainage fittings joined by solvent welding will not be approved as an equal.

F. Type D:
Schedule 40 Black Steel seamless pipe approved for natural gas systems with threaded fittings.

G. Type E:
Type L hard drawn copper tubing joined with press fittings including a factory installed sealing element made of EPDM.

H. Joints between different piping materials shall be made with a mechanical joint or dielectric fitting.

I. Pipe and fittings shall be in accordance with the following:

1.	Exterior Water Service	Type A
2.	Cold Water	Type B
3.	Hot Water Supply and Recirculation	Type B
4.	Sanitary, Waste and Vent Inside Buried	Type C
5.	Sanitary, Waste and Vent Within the Building	Type C
6.	Waste and Vent 1 1/2 inches and Smaller	Type C
7.	Sanitary from Last Building Cleanout to 5'-0" beyond Foundation Wall	Type C
8.	Gas 2 inches and Smaller	Type D
9.	Water Heater Inlet and Outlet (within mechanical closet or minimum 24 inches)	Type E
10.	Water Heater Relief Valve Discharge	Type E
11.	Water Heater Safe Pan Discharge	Type E

Note: All below slab sanitary waste piping from floor drains in garage shall be double wall piping and extend 5'-0" from building exterior wall. All exterior piping to containment tank to be double wall. Containment tank to be double wall.

2.2 VALVES

A. Shut off valves at building master water meter shall be Apollo 77CLF-200, solder end, bronze body ball valve, chrome plated bronze ball, 600 psi WOG, full port ball valve.
B. Shut-off valves on cold water, hot water and hot water recirculation piping 1/2 inch through 1 1/2 inch shall be designed for use with Cross Linked Polyethylene (PEX) tubing and be from the same manufacturer.

C. Drain valves shall be Apollo Valve with cap and chain. All drain valves shall be provided with a Watts No. 8A hose connection vacuum breaker

DV-A: Shall be Apollo 70LF-103HC 1/2 inch supply with 3/4 inch threaded connection.

D. Shut-off valves on natural gas system 1 1/2 inches and smaller shall be Apollo Series 70-100-07, threaded bronze ball valve, 600 psi WOG. Shut-off valves on natural gas systems 2 inches and larger shall be Rockwell Fig. 143, semi-steel, lubricated plug valves, flanged ends, wrench operated, 200 psi WOG.

2.3 INSULATION

A. Thermal insulation materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:

1. American Society for Testing of Materials Specifications:

a. ASTM C 547, "Standard Specification for Mineral Fiber Pipe Insulation"
b. ASTM C 585, "Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)"
c. ASTM C 1136, "Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation"

A. System Performance

1. Insulation materials furnished should meet the minimum thickness requirements of National Voluntary Consensus Standard 90.1 (1999), "Energy Efficient Design of New Buildings," of the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). However, if other factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor.

2. Insulation materials furnished and installed hereunder shall meet the fire hazard requirements of applicable building codes when tested in composite form per one of the following nominally equivalent test methods:

a. American Society for Testing of Materials	ASTM E 84
b. Underwriters' Laboratories, Inc.	UL 723 CAN/ULC-S102-M88
c. National Fire Protection Association	NFPA 255

B. Pipe Insulation

1. Molded pipe insulation shall be manufactured to meet ASTM C 585 for sizes required in the particular system.

Molded fibrous glass pipe insulation shall comply with the requirements of ASTM C 547. One of the following types shall be used:

a. For indoor systems operating at temperatures from 0° F to +850° F shall be Owens Corning Fiberglas Pipe Insulation with factory applied all-service jacket (ASJ) and two-component adhesive closure system, rated for a maximum service temperature of 850F (454C). For large pipe sizes where SSL-II is not available, the single adhesive SSL closure may be substituted. Circumferential joints shall be sealed by butt strips having a two-component sealing system. Stapling is not required to complete the

closure. When self sealing lap systems are used, sufficient thickness of insulation shall be used to maintain the outer surface temperature of the operating system below +150° F. Manufacturer's data regarding thickness constraints in relation to operating temperature shall be followed.

b. When multiple layers are required, all inner layer(s) shall be No Wrap.

c. On cold systems, vapor barrier performance is extremely important. All penetrations of the ASJ and exposed ends of insulation shall be sealed with vapor barrier mastic. If humidities in excess of 90% are expected, the ASJ shall be protected with either a mastic coating or a Suitable vapor retarding outer jacket. Vapor seals at butt joints shall be applied at every fourth pipe section joint and at each fitting to provide isolation of water incursion.

2. Fittings and valves shall be insulated with pre-formed fiberglass fittings or fabricated sections of Owens Corning Fiberglas Pipe Insulation. Thickness shall be equal to adjacent pipe insulation. Finish shall be with pre-formed PVC fitting covers or as otherwise specified on contract drawings.

   Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section sized to provide the same insulation thickness as on the main pipe section. An oversized insulation section shall be used to form a collar between the two insulation sections with low-density blanket insulation being used to fill gaps. Jacketing shall match that used on straight pipe sections. Rough cut ends shall be coated with suitable weather or vapor resistant mastic as dictated by the system location and service. On hot systems where fittings are to be left exposed, insulation ends should be beveled away from bolts for easy access.

   On cold systems, particular care must be given to vapor sealing the fitting cover or finish to the pipe insulation vapor barrier. All valve stems shall be sealed with caulking to allow free movement of the stem but provide a seal against moisture incursion.

3. All piping shall be supported in such a manner that neither the insulation nor the vapor/weather barrier is compromised by the hanger or the effects of the hanger. In all cases, hanger spacing shall be such that the circumferential joint may be made outside the hanger. On cold systems, vapor barrier shall be continuous, including material covered by the hanger saddle.

   a. Piping systems 3" in diameter or less, insulated with Owens Corning insulation, may be supported by placing saddles of the proper length and spacing under the insulation as designated in Owens Corning Pub. 1-IN-14210.

   b. Piping systems 4” in diameter and larger, operating at temperatures less than +200F (93C) and insulated with fiber glass, high density inserts such as wood or foam with sufficient compressive strength shall be used to support the weight of the piping system. At temperatures exceeding +200F (93C), high temperature pipe insulation shall be used for high density inserts.

      c. Where pipe shoes and roller supports are required, insulation shall be inserted in the pipe shoe to minimize pipe heat loss. Where possible, the pipe shoe shall be sized to be flush with the outer pipe insulation diameter.

      d. Thermal expansion and contraction of the piping and insulation system can generally be taken care of by utilizing double layers of insulation and staggering both longitudinal and circumferential joints. Where long runs are encountered,

expansion joints may be required where single layers of insulation are being used and should be so noted on the contract drawings.

e. On vertical runs, insulation support rings shall be used as indicated on contract drawings.

4. Accessory Materials

Accessory materials installed as part of insulation work under his section shall include (but not be limited to):

a. Closure Materials - Butt strips, bands, wires, staples, mastics, adhesives; pressure-sensitive tapes

b. Field-applied jacketing materials - Sheet metal, plastic, canvas, fiber glass cloth, insulating cement, PVC fitting covers

c. Support Materials - Hanger straps, hanger rods, saddles, support rings

D. Insulation shall be in accordance with the following schedule:

System	Insulation Thickness
Cold Water	1/2”
Hot Water and Hot Water Recirculation	1”

2.4 HANGERS AND SUPPORT

A. Pipe hangers, pipe anchors, auxiliary steel, wood blocking and fixture supports shall be furnished and set by this Contractor, and he shall be responsible for their proper and permanent location. This Contractor shall be responsible for all core drilling.

B. All piping shall be rigidly supported from the building structure by means of approved hangers and supports. The hanging and support of all piping system shall conform to the ANSI/MSS-SP.58 AND MSS-SP 69 latest edition. This Contractor shall furnish and install all required auxiliary steel required for hanging of piping.

C. All horizontal piping shall be hung with approved adjustable malleable iron pipe hangers.

1. Copper tubing 1-1/2 inch and larger shall be supported at ten (10) foot intervals. Copper tubing 1-1/4 inch and smaller shall be supported at six (6) foot intervals.
2. Steel piping shall be supported at six (6) foot intervals for piping 1/2 inch and smaller, at eight (8) foot intervals for 3/4 inch and one inch piping and at ten (10) foot intervals for piping 1-1/4 inch and larger.
3. Plastic piping shall be supported at 3 foot intervals for 1-1/4 inch piping and at 4 foot intervals for 1 1/2 inch piping and larger.
4. Cross Linked Polyethylene (PEX) tubing 1/2 inch through 1 1/2 inch shall be supported at 32 inch intervals.

5. Corrugated stainless steel tubing (CSST) for fuel gas piping systems shall be supported at six (6) foot intervals for piping 1/2 inch and at eight (8) foot intervals for 1 inch and larger.

D. Vertical hangers

1. Steel piping shall be supported at each story height and at not more than ten (10) foot intervals.
2. Copper tubing shall be supported at each story height and at not more than ten (10) foot intervals.
3. Plastic piping shall be supported at each floor.
4. Cross Linked Polyethylene (PEX) tubing 1/2 inch through 1 1/2 inch shall be supported at 32 inch intervals.
5. Corrugated stainless steel tubing (CSST) for fuel gas piping systems shall be supported at each floor.

E. Hangers for piping sizes four (4) inches and smaller shall be Carpenter & Paterson, No. 1A band type, Grinnell Company, Calco Steel Products Company or equal, black steel with hanger rods with machine threads. Hangers for piping larger than four (4) inches shall be the adjustable clevis hanger type, malleable iron with extension rod. Chain, strap, perforated bar or wire hangers will not be approved. Approved gang hangers may be used in lieu of separate hangers on pipes running parallel to each other and close together. Where used for uninsulated copper tubing, all hangers shall be copper plated and chrome plated for chrome plated piping. Insulation shields shall be provided on all horizontal insulated piping at each hanger or support location. Insulation shields shall be galvanized steel, 180 degrees arc and centered on the hanger or support. On diameters 4 inches and smaller, shield shall be 12-inch long, 18 gauge steel. On diameters 5 inches and 6 inches, shield shall be 18-inch long, 16 gauge steel. On diameters 8 inches and 10 inches, shield shall be 24-inch long, 14 gauge steel. On diameters greater than 10 inches, shield shall be 24-inch long, 12 gauge steel. Structure attachments shall be as manufactured by Carpenter & Patterson and shall be suitable to carry the weight.

F. All fixtures and equipment shall be supported and fastened in a satisfactory manner and in accordance with fixture manufacturer's recommendations.

G. Where chair carriers are required, they shall be completely concealed in the building construction and shall rigidly support the fixture from the floor. Chair carrier shall support fixtures in such a manner that no part of the fixture will be supported by the wall or partition. Chair carriers shall be furnished complete with necessary bolts, nuts and washers as well as connecting nipples of the proper length with gaskets for the fixture connection. All available or optional anchor foot assemblies shall be utilized. Carriers must fit in available space and shall be of the special narrow type or compact style where necessary. Chair carriers for water closets and urinals shall include flushometer supply pipe support. Flushometer supply pipe shall always be provided with a concealed support regardless of if the design includes a carrier or not.

H. Wherever wood blocking is required to insure adequate support of fixtures and related piping, it shall be provided by this Contractor and it shall be fire treated.

G. All inserts in new concrete construction shall be capable of developing the full strength of the rod or bolt used in them and shall be either continuous insert type or malleable iron concrete inserts for rod sizes 3/8 inch to 7/8 inch. Continuous inserts shall have anchors every 4 inches and shall extend 1-1/2 inches above the back of the insert and shall hook to provide anchor. All inserts shall be tied to the reinforcing steel rods with wire and properly sized reinforcing rods shall be inserted through the special holes, hooks or brackets provided in or on the inserts to securely anchor insert to the structure.

I. Seismic Restraints: It is the intent of this seismic specification to keep all mechanical building system components in place during a seismic event.

1. All mechanical systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.

2. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. Contractor shall submit a report outlining the structural engineer’s review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.

3. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

2.5 SLEEVES, ESCUTCHEONS AND FIRESTOPPING

A. Sleeves shall be furnished and set by this Contractor and he shall be responsible for their proper and permanent location. This Contractor shall be responsible for all core drilling. Core openings shall have link-seal fire-rated penetration closures.

B. This Contractor shall provide steel sleeves at all points where pipes and all other work under his charge pass through masonry, concrete or wood. Sleeves shall have flanges or wings at mind-points to prevent sleeve from slipping through the floor or wall. Pipe sleeves shall be sufficient diameter to provide approximately 1/4 inch clearance around the pipe or the insulation on insulated systems. Sleeves through walls shall end flush with the surface of the walls. Sleeves in floors shall extend one inch above the floor and after installation of piping shall be packed, fire-stopped and made watertight. Sleeves in exterior walls shall have water-stop plates, shall end flush with the surface of the walls, shall have link-seal penetration closures and shall be of a diameter that is compatible with the Link Seal System.

C. Seal the sleeve penetrations with firestopping and smoke stopping systems as manufactured by Dow Corning, Bio-Shield, Rectorseal Metacaulk, 3M, Fyre Putty or equal. Where pipes penetrate fire rated construction, the openings shall be packed with the material and system that shall maintain the integrity of the fire rating as detailed in the UL Fire Resistance Directory.

Note: Refer to architectural drawings for rated walls and partitions. Where there are no architectural drawings or they do not indicate rated walls and partitions, the following guidelines shall be used. All floors, corridor walls, party walls, mechanical room walls, duct and pipe chase walls, stairwells, trash room and chute walls shall be considered minimum two hour fire rated

walls.

D. Products for fire safing of PVC piping shall be Proset System "C" or approved equal.

E. Pipe Sleeves shall be according to the following:

1. Sleeves on pipes passing through masonry or concrete construction shall be scheduled 40 galvanized steel pipe.

2. Sleeves on pipes passing through wood or drywall partitions shall be 16 gauge galvanized steel.

F. Whenever new penetrations to a previously poured slab are required for the installation of floor drains, shower drains, mop receptors, flush floor cleanouts or similar items of plumbing, these penetrations shall be totally sealed with a fire and water stop sealant. Sealant shall be Dow Corning fire stop sealant, Catalog No. 2000. Hourly fire rating in hours must be meet the requirements of the slab being penetrated.

G. Provide chrome plated brass escutcheons with set screws for exposed piping in all areas. In mechanical rooms use plain brass or cast iron escutcheons suitable for painting. All escutcheons shall be sized to fit the bare pipe or insulation in a snug and neat manner. They shall be of sufficient size to cover sleeves openings for the pipes and of sufficient depth to cover sleeves projecting above floors.

H. Bored holes within wood construction. A hole not greater in diameter than 40 percent of the stud width is permitted to be bored in any wood stud. Bored holes not greater than 60 percent of the width of the stud are permitted in nonbearing partitions or in any wall where each bored stud is doubled, provided not more than two such successive doubled studs are so bored. In no case shall the edge of the bored hole be nearer than 5/8 inch (15.9 mm) to the edge of the stud. Bored holes shall not be located at the same section of stud as a cut or notch.

2.6 CLEANOUTS

A. Cleanouts shall be as manufactured by Josam Manufacturing Company, Jay R. Smith Manufacturing Company, Zurn Industries, Inc. or approved equal. The following series numbers are intended to establish a level of quality and comparison.

B. Type A: Jay R. Smith 4033L-F-C-XH coated cast iron floor cleanout with nickel bronze top and extra heavy gasket.

2.7 NON-FREEZE WALL HYDRANTS

A. NFWH shall be ZURN Model No.1301 stainless steel box and cover, bronze nickel plated hydrant, bronze casing, hose connection with integral vacuum breaker, sweat inlet connection, T-handle key and adjustable wall clamp. Length to suit wall thickness. Provide with mild climate, Jay R. Smith Figure No. SAP where applicable.

2.8 FLOOR DRAINS

A. All floor drains shall be the product of one manufacturer such as Jay R. Smith, Josam, Zurn, or approved equal.

B. Garage Floor Drains - Zurn model number Z662 heavy duty floor drain with sediment bucket.

C. General Floor Drains not in garage - Cast iron body and flashing collar with and 5-inch nickel bronze adjustable square strainer, similar to Zurn 415-B-TP.
Provide Proset Systems trap guard drain insert.

D. Provide round funnel similar to Jay R. Smith Figure No. 3580 where applicable.
Install heavy-duty cast iron floor drains and strainers in garage area with trap primers.

2.9 PLUMBING FIXTURES

A. See Plumbing Fixture Schedule on Drawings

2.10 WATER HEATERS

Emergency Shower and Eyewash Heater

A. Hubbell Model no. EMV120 – 85 – SL – PS Propane fired 120 gallon water heater with integral thermostatic mixing valve and Hydrastone cement lining. Set delivery temperature to 85 Degrees F.

B. Water supply piping serving thermal expansion absorber and water heaters shall be provided with a shutoff valve and check valve with a 1/8 inch hole drilled in the clapper.

C. Burner to be modified and field adjusted for propane gas.

Venting material:
CPVC

Domestic Electric water heater for fixtures shall be A.O. Smith “Voltex” hybrid 66 gallon electric heat pump water heater. The water heater shall be 208/240 Volt, 60 HZ single phase 30 amp power supply.

D. Installation
1. Installation shall be in strict accordance with manufacturer’s installation manual. Install complete system on wall as compact as possible. Keep components as close as possible to heater

E. Warranty
1. Heat Exchanger: 12 years.
2. Parts: 2 years.
3. Labor: 1 year
4. Installation procedure, start up and training session shall be provided by factory trained service technician.

F. Water inlet and outlet connections shall be Type L copper for a minimum of the 24 inches.

G. Installation
1. Installation shall be in strict accordance with manufacturers installation manual.

2.11 SHOCK ABSORBERS

A. Maintenance free water hammer arresters shall be furnished and installed at all locations in the water systems where quick acting valves are installed as well as wherever water hammer may occur.

B. Examples of such locations are as follows:
1. As indicated on the drawings.
2. Flushometer valves.
3. Self-closing and metering faucets.
4. Prior to all pressure reducing valves.
5. Prior to all in-line solenoid valves.
6. Dishwashing Machines.
7. All laundry equipment.

C. Water hammer arresters shall be as manufactured by Josam Manufacturing Company, Jay R. Smith Manufacturing Company or Zurn Systems. Arresters shall be installed at each and every multiple of fixtures or items as listed above and/or as indicated on drawings. Water hammer arresters may serve groups of fixtures.

D. Sizing, placement, tested, certified and shall be in accordance with Plumbing and Drainage Institute Standard PDI-WH-201 and the manufacturer's recommendations.

E. Water hammer arresters shall be as follows:

Designation	Fixture Unit Rating	Model
SA-A	1-11	Jay R. Smith 5005
SA-B	12-32	Jay R. Smith 5010
SA-C	33-60	Jay R. Smith 5020
SA-D	61-113	Jay R. Smith 5030
SA-E	114-154	Jay R. Smith 5040
SA-F	155-330	Jay R. Smith 5050

F. Air chambers will not be approved as an equal.

2.12 PRESSURE GAUGES

A. Pressure gauge shall be manufactured by Trerice Company, Taylor Instrument or Marshalltown Manufacturing.

B. Interior water pressure gauge shall be Trerice Company 700 Series with 4 inch diameter face.

Interior natural gas shall be by Trerice Company 760B with 4 inch diameter face.
Exterior natural gas shall be by Trerice Company 766SS with 4 inch diameter face.

C. Pressure gauges shall have brass movement, aluminum case, double strength clear glass window with black embossed figures and graduations on a white dial face, with 1 percent accuracy of scale range.

D. Gauges shall be furnished with snubbers and needle valve shut off valves.

E. Gauges shall be furnished with ranges that will locate the intended pressure at the point of application approximately midpoint on the range scale.

2.13 THERMOMETERS

A. Thermometers shall be Trerice Company SX9 solar light powered digital thermometer with 7 inch adjustable angle cast aluminum case and LCD display.

B. Thermometers shall be furnished with the temperature range of -40°F to 300°F.

C. Thermometers shall be furnished complete with all necessary sockets, wells, connectors and accessories required for installation suitable for the service in which installed. Extension necks shall be furnished for insulated piping.

2.14 PIPE IDENTIFICATION AND VALVE TAGS

A. All piping, except that piping which is within inaccessible chases, shall be identified with semi-rigid plastic identification markers equal to Seton Setmark pipe markers. Direction of flow arrows are to be included on each marker. Each marker background shall be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the “Scheme for the Identification of Piping Systems” (ANSI/ASME A13.1-2007). Setmark snap-around markers shall be used for overall diameters up to six inches and strap-around markers shall be used above six inch overall diameters. Markers shall be located adjacent to each valve, at each branch, at each cap for future, at each riser take off, at each pipe passage through wall, at each pipe passage through floors, at each pipe passage to underground and on vertical and horizontal piping at 20 foot intervals maximum.

B. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve chart. Valve tags shall be 19 gauge polished brass, 1-1/2 inch diameter with stamped black filled letters similar to Seton S type 250-BL or approved equal. Lettering shall be 1/4 inch high for type service and 1/2 inch for valve number. Tag shall be attached to valves with approved brass "S" hooks, or brass jack chain. Whenever a valve is above a hung ceiling, the valve tag shall be located immediately above the hung ceiling.

C. Furnish a minimum of two typed valve lists to be framed under glass or Plexiglass. Each chart shall be enclosed in an approved .015 inch thick plastic closure for permanent protection. Valve numbers shall correspond to those indicated on the Record Drawings and on the printed valve lists. The printed list shall include the valve number, location and purpose of each valve. It shall state other necessary information such as the required opening or closing of another valve

when one valve is to be opened or closed. Printed framed valve lists shall be displayed in each Mechanical Room or in a location designated by the owner.

D. Equipment nameplates shall be 3/4 inch by 2-1/2 inch long .02 inch aluminum with a black enamel background with engraved natural aluminum letters similar to Seton Style 2065-20. Nameplate shall have pressure sensitive taped backing.

E. All interior and exterior underground piping and utilities shall have metalized warning tape installed above the pipe or line that identifies the specific system buried below. Tape shall consist of a minimum 3.5 mil solid foil core encased in a protective plastic jacket (total thickness 5.5. mils) and be 6” wide with black lettering imprinted on a color coded background that conforms to APWA color code specifications. Tape shall be installed from 18” to 30” above the pipe and in no case less than 6” below grade.

F. All interior and exterior underground non-metallic piping and utilities shall have a tracer wire installed along the length of the pipe. Tracer wire shall be 14 gauge minimum, copper single-conductor wire with insulation and shall be continuous along the pipeline passing through the inside of each valve box.

2.15 DISINFECTION OF WATER SYSTEMS

A. All water systems shall be disinfected in accordance with Local Public Health and Plumbing Code Requirements.

2.16 TESTS AND APPROVALS

1. Pipe lines shall be blown or flushed clean, before piping tests are applied. All plumbing work shall be tested as herein specified. No portion shall be covered, concealed, used or made inaccessible to testing, inspection, repair, correction or replacement until tests thereof have been satisfactorily completed in the presence of the Architect's Authorized Representatives. The Plumbing Subcontractor must accommodate his testing operations to the progress of the project as a whole. Correct all defects appearing under test and repeat the tests until all parts of the work have withstood them successfully.

2. Furnish all labor, material and services for testing, including testing plugs, pumps and compressors; he shall make and remove all temporary piping connections required for the tests and shall dispose of test water and all wastes after tests. Leave all work in good order, ready for full use.

3. Tests on all plumbing systems shall be made in accordance with the requirements of the Local Plumbing Code and the codes, standards, recommended practices and manuals of the National Fire Protection Association.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Prior to the work of this section, this Contractor must ascertain that preceding work has been accomplished in a manner to permit compliance with the level of quality required by this Section.

B. The entire work provided in this specification shall be constructed and finished in every respect in a workmanlike and substantial manner. It is not intended that the drawings shall show every pipe, fitting, and appliance. Furnish all parts as may be necessary to complete the system in accordance with the best trade practices and to be the satisfaction of the Architect, Engineer and General Contractor.

C. This Contractor shall keep other contractors fully informed as the shape, size and position of all openings required for his apparatus and shall give full information to the General Contractor or other contractors sufficiently in advance of the work so that all openings may be built in advance. Furnish and install all sleeves, supports, etc., specified or required.

D. In the case of failure on the part of this Subcontractor to give proper and timely information as noted above, he shall do his own cutting and patching, or have same done by the General Contractor at this subcontractor's expense, but in any case, without extra expense to the Owner and General Contractor.

E. This Contractor shall obtain detailed information from the manufacturer of apparatus as to the proper method of installing and connecting same. He shall also obtain all information from the General Contractor and the other contractors which may be necessary to facilitate his work and the completion of the whole project.

3.2 CORE DRILLING

A. All holes through concrete or masonry for the passage of plumbing piping not provided by sleeves or openings at the time of casting, shall be cut by the Plumbing Contractor using an approved core boring machine with diamond edge bit and vacuum sludge removal device. The size of holes shall provide for fire stopping around a pipe. The location of all core drilled holes shall be coordinated with the structural reinforcing and be reviewed by the Architect prior to commencing work.

B. Prior to coring, the Plumbing Contractor shall submit a minimum 1/8 in. scale plan, dimensioning the location of proposed cored opening locations and indicating the core diameter. Prior to developing the coring plan, the Plumbing Contractor shall examine the site carefully in an attempt to determine whether there are structural, mechanical or electrical obstacles in the proposed coring locations. Once the plans are reviewed by the Architect and Owner's representative, the Plumbing Contractor may proceed with caution. If an electrical conduit, for example, was hit during coring operations, and it was determined that the Plumbing Contractor was negligent by not noting a conduit turning into the slab below, he would be responsible for the repair cost. If the Contractor were not found to be negligent, then the Owner would assume the cost of the repair.

3.3 TESTING PIPING SYSTEMS

A. Test all work in the presence of the Architect/Engineer and/or Owner, Owner's representative and Plumbing Inspector as called for in local codes.

B. After soil, waste and vent piping is in place and before being furred in, plug lower ends and fill. The system shall be left tight under these conditions and water level shall be maintained intact for a period of at least four hours.

C. Test domestic water piping and service by applying a hydrostatic pressure of 125 psi using a pump for this purpose. Make sure that all lines are properly plugged or capped, and that air has been vented before applying pressure, which shall remain constant without pumping for one hour at least.

D. Gas system piping shall be tested at a pressure of 50 psig and pressure shall be held for two hours minimum.

E. This Contractor shall furnish all equipment, labor and materials, required for these tests.

F. Any leaks in joints or evidence of defective pipe or fittings disclosed by tests shall be immediately corrected by replacing defective parts with new joints or corrected materials. No makeshift repairs effected by caulking threaded pipe with lead wool, application of wicking or patented compounds being permitted. Perform smoke tests as required by local code or by the Architect/Engineer.

3.4 PROTECTION AND CLEANING

A. Each subcontractor shall be responsible for his work and equipment until finally inspected, tested and accepted. Carefully store materials and equipment, which are not immediately installed after delivery on site. Close open ends or work with temporary covers or plug during construction to prevent entry of obstructing materials.

B. Each subcontractor shall protect work and materials of other trades from damage that might be caused by his work or workman and make good damage thus caused.

C. The premises shall be kept reasonably clean at all times, and rubbish shall be removed as directed by the General Contractor.

D. Refer to section 017329 for additional information and requirements.

E. Upon completion of this work, the Contractor shall clean all fixtures and equipment and replace damaged parts. Upon failure of this Contractor to fulfill his obligation, this work will be taken care of at his expense.

3.5 WORK COORDINATION AND JOB COORDINATION

A. Plumbing equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same with the other trades and the General Contractor.

B. Particular attention shall be directed to the coordination of system with all equipment of other trades installed in and above the ceiling areas. Conflicts in heights and clearance above hung ceilings shall be brought to the attention of the General Contractor for a decision before equipment is installed.

C. Furnish to the General Contractor and other trades all information relative to the position of the plumbing installation that will affect them so that they may plan their work and installation accordingly.

3.6 SUPPLEMENTARY STEEL, CHANNEL AND SUPPORTS

A. Furnish and install all supplementary steel, channels and supports required for the proper installation, mounting and support of all equipment.

B. Supplementary steel and channels shall be firmly connected to building construction in a manner approved by the Architect/Engineer.

C. The type and size of the supporting channels and supplementary steel shall be determined by the Plumbing Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.

D. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. all turns to be made with 90 degree fittings, as required to suit the construction and installation conditions.

3.7 SLEEVES AND INSERTS

A. Sleeves shall be furnished, set and properly secured in place and at all points where piping passes through masonry or concrete. All sleeves shall be of sufficient diameter to provide 1/4-in. clearance around the pipe.

B. Sleeves through concrete slabs, and interior concrete and masonry walls or partitions shall be steel pipe. Fire stop annular openings between sleeves and pipes at floor slab passages and make watertight. Galvanized sleeves and copper piping shall not be placed in concrete.

C. Install UL listed and FM approved inserts or other anchoring devices in concrete and masonry construction as required to support piping. Inserts shall be of the adjustable type as manufactured by Carpenter and Patterson, Grinnell, or Fee and Mason.

3.8 SYSTEM IDENTIFICATION

A. All valves on pipes of every description shall have circular brass valve tags of at least 1-1/2 in. in diameter, attached with brass hooks to each valve stem. Stamp number of the valve and the service, such as "HW", "CW", "GAS", etc., for hot water, cold water, gas, etc., respectively. The numbers of each service shall be consecutive and shall correspond with the numbers indicated for valves and controls on the record drawings and on three printed valve lists. These printed lists shall state number and locations of each valve and control and the section, fixture or equipment which it controls.

B. The printed valve lists shall be prepared in a form to meet the approval of the Architect and Engineer and one copy shall be framed under glass and mounted in approved locations.

C. All plumbing lines and equipment shall be identified by pipe markings, which shall be provided by this Contractor. Markers shall be applied every 20 ft. Markings shall indicate pipe content and direction of flow. The markers shall be as manufactured by Seton Name Plate Corp. or equal.

3.9 SAFETY PRECAUTIONS

A. Furnish, place and maintain proper guards for the prevention of accidents and any other necessary construction required to secure safety of life and property.

3.10 INSERTS AND OPENINGS

A. Inserts: Install inserts or other anchoring devices in concrete and masonry construction as required to support piping. Inserts shall be of the adjustable type as manufactured by Carpenter and Patterson, Grinnell of Fee and Mason.

B. Escutcheons: All exposed pipe, uncovered, passing through walls, floors or ceilings shall be fitted with one piece chrome plated brass escutcheons with set screw holding in position. Floor escutcheons to be deep enough to fit over sleeves, fastened to pipe and extending down to floor.

3.11 PLANS AND SPECIFICATIONS

A. The drawing showing layout of the plumbing systems indicate the approximate location of outlets, apparatus and equipment are schematic. The final determination as to the routing shall be governed by structural conditions and other obstructions.

B. The right to make any reasonable change in the location of outlets, apparatus and equipment up to the time of the roughing-in is reserved by the Architect and Engineer without involving any expense to the Owner or the General Contractor.

C. The specifications supplement the drawings and provide specifics pertaining to the methods of material to be used in the execution of the work.

3.12 SANITARY WASTE AND VENT SYSTEMS

A. Furnish and install piping to take wastes from all soil and waste stacks, fixtures, drains and equipment as indicated and/or described in these plans and specifications.

B. Unless specifically noted otherwise on the plans, all horizontal piping 4 in. and larger shall be pitched at the rate of 1/8 in. per foot in the direction of the flow. Horizontal piping 3 in. and smaller shall be pitched at the rate of 1/4 in. per foot in the direction of the flow.

C. Vent System: Furnish and install piping to vent all stacks, fixtures, traps and appliances as indicated on the drawings and/or required to meet the Plumbing Code. All vent piping shall be concealed where possible with the horizontal pipe pitching back toward fixtures to allow connection to drain. Whether indicated on plan, riser diagram or not, offset vents below the roof to avoid air intakes, equipment, penthouse mansard etc., bring vents through the roof a minimum of 10 feet away from air intakes, windows, and operable sash and 10 ft. away from other obstructions.

3.13 HOT AND COLD WATER SYSTEMS

A. Furnish and install complete cold, hot and hot water return systems to service all fixtures and equipment indicated on the drawings or specified as requiring cold or hot water. Cold water piping shall start at the connection to the water main indicated on plan and extend to all fixtures and equipment, including piping, fittings and valves requiring connections. Hot water piping shall extend from the hot water heater to all fixtures and equipment, including piping, fittings and valves. In general, piping shall pitch upward in the direction of flow with each branch and riser separately valved and with 1/2 in. hose end drains on the outlet side of the valve and at all low points in the systems. Install valves for each battery of fixtures and other valves as necessary to isolate all parts of these systems. All valves shall be accessible.

B. Hot water piping shall be circulated as shown on plans to ensure uniform temperatures throughout the system. All branches larger than 50 ft. shall be provided with hot water return lines.

3.14 PROPANE GAS SYSTEM

A. Furnish and install pipe, fittings, valves and connections to all propane gas-fired equipment and all accessories and incidentals as indicated or specified to maintain a complete gas system. Install solenoid valves supplied by others as required. Installations shall be made in accordance with the State Gas Code requirements. All horizontal gas piping shall be pitched not less than 1/4 in. in 15 ft. to prevent traps. Pitch piping to risers. Install an 8 in. long sediment leg at the base of all risers.

B. All changes in direction shall be made with plugged tees for cleaning out piping. All horizontal branch outlet pipes shall be taken from the top or side of horizontal mains and not from the bottom. Coordinate the installation of the gas system with the propane utility company and General Contractor.

C. Provide gas train vents to the atmosphere for all gas-fired equipment as required by Code.

D. Welders Qualifications

1. Qualifications of the procedure and of the welding operations and welders shall be as specified in American Welding Society, AWS D10.9-80, "Specification for Qualification of Welding Procedures and Welders for Pipe and Tubing"; ANSI B31.1 and ASME Boiler Code, Section 1X.

2. The contractor shall provide certification in writing that the operator or welder has met the above prescribed standard. The owner reserves the right to radio graphically test a minimum of 5% of the welds.

3.15 INSULATION

A. Ensure that all pipe and fitting surfaces over which insulation is to be installed are clean and dry.

B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.

C. Ensure that pressure testing of piping and fittings has been completed prior to installing insulation.

D. General

1. Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices to ensure that it will serve its intended purpose.

2. Install insulation on piping subsequent to installation of heat tracing, painting, and acceptance tests.

3. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.

4. Maintain the integrity of factory-applied vapor barrier jacketing on all pipe insulation, protecting it against puncture, tears or other damage. All staples used on cold pipe insulation shall be coated with suitable sealant to maintain vapor barrier integrity.

E. Fittings

1. Cover valves, fittings, and similar items in each piping system using one of the following:

2. Mitered sections of insulation equivalent in thickness and composition to that installed on straight pipe runs.

3. Insulation cement equal in thickness to the adjoining insulation.

4. Owens Corning PVC Fitting Covers insulated with material equal in thickness and composition to adjoining insulation.

F. Penetrations

1. Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise specified.

G. Joints

1. Butt pipe insulation against hanger inserts. For hot pipes, it is recommended all joints be staggered when operating temperature is over 400F (204C) double layer. Seal jacketing according to type being used. For cold piping, seal self-sealing laps by firmly rubbing down surface of tape and flap.

2. All pipe insulation ends shall be tapered and sealed, regardless of service.

H. Vertical Piping

1. If specified on contract drawings, all insulated, exposed vertical piping within the building and all insulated piping exposed to the outdoors shall be additionally jacketed with 0.016" thick (0.4 mm) (minimum) aluminum. Vertical piping shall be protected to a height of 8'-0" (2.4 m) above the floor.

I. Field Quality Assurance

1. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

J. Protection

1. Replace damaged insulation, which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

2. The insulation contractor shall advise the general and/or the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

K. Safety Precautions

1. Insulation contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.

2. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

3.16 CHLORINATION

A. All water lines and water service shall be thoroughly flushed and chlorinated before being put into service. The domestic cold and hot water systems shall be chlorinated and flushed in accordance with the requirements of the State Plumbing Code and Local Inspector.

B. Submit a certificate of compliance when chlorination has been completed stating when performed, by whom and who witnessed the procedure.

3.17 WATER SERVICE

A. Furnish and install a complete water service piping system to five feet outside the building foundation including piping, fittings and supports, valves, and connection to the water main as shown on the drawings and specified herein.

B. Provide and install a new Amtrol “Well-X-Trol” pressure tank and set for 50 psi discharge pressure.

C. All materials and installation shall be in complete accord with the requirements of the local water authority and NFPA Pamphlet. Pay all inspection fees. Include in bid.

D. Backfilling of trench excavation will not be permitted until after the domestic water service line has been installed, inspected, tested and accepted. With prior written approval of the Architect, partial backfill may be installed, leaving joints exposed.

E. When a section of pipe is ready for testing, the line shall be completely filled with water, thoroughly cleaned for elimination of all air, and a leakage test made.

F. Testing shall be carried out in an approved manner and shall consist of filling the main with water from the municipal distribution system and maintaining a hydrostatic test pressure of 200 per NFPA 24 Standards. All visible leaks shall be made tight in an approved manner. Any defective pipe, fitting or material shall be removed and replaced at the expense of the Contractor and the test shall be repeated until the conditions of allowable leakage are met. Thoroughly flush the service per NFPA 24 Standards.

G. Disinfection shall be performed in an approved manner in conforming with AWWA "Procedure for Disinfecting Water Mains" designation C601-48 and shall be witnessed by the Architect or his authorized agent. Before disinfection, the line shall be flushed with water to create as high a velocity as practicable.

H. Following chlorination and after the entire length of the line is ready for operation, all treated water shall be flushed thoroughly from the newly laid pipe line, at its extremities, until the replacement water throughout its length will upon test, both chemical and bacteriological, be provided equal to the quality introduced at the permanent source of supply. Where bends turn down and the resulting thrust will be upward, provision to restrain the thrust shall be made with joint harnesses or thrust blocks. Submit proposed methods to Architect for approval.

END OF SECTION

SECTION 23 0000
MECHANICAL REQUIREMENTS

PART 1: GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 SUMMARY OF WORK

A. Provide complete functional Heating, Ventilating and Air Conditioning system as shown on Mechanical Construction Documents.

1.3 REFERENCE STANDARDS

A. NFPA Standards

B. ANSI Standards

C. ASME Standards

D. ASTM Standards

E. AWWA Standards

F. ASHRAE Standards

G. SMACNA Standards

H. OSHA Standards

I. NEBB Standards

J. Local Codes and Ordinances

K. Owner's Insurance Company Requirements

L. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the contract documents shall take precedence.

M. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section.

1.4 CONTRACT DRAWINGS & SPECIFICATIONS

A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before proper execution of the work.

B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.

1.5 CONFLICT BETWEEN PLANS AND SPECIFICATIONS

A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.

1.6 SHOP DRAWINGS AND PRODUCT DATA

A. SUBMITTALS: Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication, or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable industry, and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor propose to furnish.

B. Submit in accordance with Division 1.

C. It is the intent of these specifications that all equipment, materials and workmanship used on this project be in complete conformance with all local, state and national codes, ordinances and standards.

D. Substitutions shall be equivalent to specified equipment in all aspects of quality and performance and shall conform to the intent stated above. It is the contractor's responsibility to submit only those items that meet these requirements. Should any non-conforming items be installed, they shall be replaced by the contractor at no additional cost to the owner.

E. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist.

F. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, it shall be provided. Contractor to assume cost and entire responsibility thereof.

1.7 INSPECTION AND TESTS

A. During the progress of the work it shall be subject to the inspection of the Owner and to such other inspectors, as may have jurisdiction.

B. At completion of the work, Contractor shall submit to the Owner's representative in writing a statement stating: (1) that the work is complete; (2) that the entire installation is in accordance with the specification; (3) that preliminary tests have been made; and (4) that the work is ready for final inspection and test.

C. A final inspection of the installation to determine compliance with the drawing and specifications will be made by the Owner's representative. Work will be checked for quality of materials, quality of workmanship, proper installation and finished appearance. This Contractor shall provide the services of the project foreman for inspection purposes. The foreman shall remove and reinstall access panels, ceiling tiles, etc., as required to facilitate any inspections required by the Owner's representative.

D. The Contractor shall arrange and conduct operating tests on all equipment in the presence of the Owner's representative. The component parts of systems and the various systems shall be demonstrated to operate in accordance with the requirements and intent of this specification. Any non-complying or defective materials or workmanship disclosed as a result of the inspection and the Contractor shall correct tests promptly, and the tests repeated as often as necessary until approved and accepted by the Owner's representative.

1.8 ELECTRICAL EQUIPMENT

A. Electrical components of mechanical equipment and systems, such as motors, factory mounted motor starters, disconnects, and control equipment shall be provided under the related Section of Division 23.

B. Temperature control equipment, including thermostats, zone valves, relays, aquastats, etc. shall be provided under related sections of Division 23. Temperature control wiring not specifically shown on electrical drawings shall be provided under related Section of Division 23.

C. Upon completion of temperature control system wiring, the responsibility of the control system will fall under Division 23.

D. All electrical equipment installed in concealed spaces shall be provided with a hard-wired electrical connection. Plug-type disconnects shall not be allowed in concealed spaces. Equipment provided with plug-in cords shall not have their cords modified.

1.9 OPENINGS IN EXTERIOR WALLS OR ROOF

A. Openings in exterior walls or roof shall be kept properly plugged and caulked at all times, except when being worked on to preclude the possibility of flooding due to storm or other causes. After completion of work, openings shall be permanently sealed and caulked in a manner approved by the Architect.

1.10 GUARANTEE

A. Except as otherwise specified, all work, materials and equipment shall be guaranteed against defects resulting from the use of inferior materials, equipment, or workmanship for one year from the date of final completion of the contract, or from full acceptance by the Owner, whichever is earlier.

B. If, within any guarantee period, repairs or changes to guaranteed work are required as a result of the use of defective materials or equipment, inferior workmanship or work that is not in accordance with the terms of the contract, and upon receipt of notice from the Owner, the following shall be done without expense to the Owner.

C. Place in satisfactory condition in every particular all of such guaranteed work and correct all defects therein.

D. Repair all damage to the building or site/equipment or contents thereof which is the result of the use of defective materials or equipment or inferior workmanship, or of work not in accordance with the terms of the contract.

E. Make good any work or materials, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.

F. In fulfilling the requirements of the contract or of any guarantee embraced in or required thereby, any work guaranteed under another contract is disturbed, restore such disturbed work to original condition and guarantee such restored work to the same extent as it was guaranteed under such other contract.

G. If upon failure to proceed promptly after notice to comply with the terms of the guarantee, the Owner may have the defects corrected and Contractor and his surety shall be liable for all expenses incurred.

H. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities, which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of one (1) year minimum from the date of acceptance or final payment.

1.11 CLEANING OF SYSTEM

A. Thoroughly clean piping, ducts, fixtures and equipment of all foreign substances inside and out before placing in operation. All air handling equipment shall be provided with “construction filters” for use during construction. Once construction is substantially complete and prior to final testing adjusting and balancing, furnish and install new filters for each piece of equipment.

B. If any foreign matter should stop any part of a system after being placed in operation, clean and reconnect system.

C. Remove all covers of interior floor drains and cleanouts, clean of all dirt, concrete traces, etc., then lightly grease and reinstall.

1.12 TEMPORARY OPENINGS

A. Coordinate construction and provide temporary openings in the building as required for the admission of equipment furnished under this Division.

1.13 DEFINITIONS

A. "Piping" includes, in addition to pipe, all fittings, valves, hangers, and other accessories relating to such piping.

B. "Concealed" means hidden from sight in trenches, chases, furred spaces, shafts, hung ceilings, embedded in construction or in crawl spaces.

C. "Exposed" means not installed underground or "concealed" as defined above.

D. "Provide" means furnish and install complete and ready to operate.

1.14 EQUIPMENT DEVIATIONS

A. Where proposals to use an item of equipment other than that specified which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Architect at the Contractor’s expense.

B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

1.15 EQUIPMENT PADS

A. All grade and floor mounted equipment shall be provided with a reinforced concrete pad. Refer to architectural plans for pad locations, thickness, sizes, and construction requirements.

B. If grade and/or floor mounted equipment is shown but no pad indicated on the architectural plans the contractor shall be responsible for clarifying the necessity, size, and location of any pads during the bidding process. No additional compensation will be given for pads which are required by this section but not indicated on the plans if no formal request for clarification was issued during the bidding process.

1.16 ELECTRICAL ROOM REQUIREMENTS

A. Do not install any piping, ductwork or equipment in or through electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms, unless piping or ductwork of equipment is intended to serve these rooms. Additionally, no ductwork or piping will be installed above electric panels. If the Contractor violates this requirement, he shall

remove and/or relocate all items as required at his expense and to the satisfaction of the Architect.

1.17 COOPERATION WITH OTHER TRADES

A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. Coordination drawings shall be initiated by this contractor. It this contractor's responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under Section 230000 of the Specifications.

1. Drawings shall be prepared at not less than 1/4 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services.

2. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections 210000, 220000, and 260000, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted.

3. After each Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each drawing has been coordinated between trades, and appropriate revisions made, each trade shall sign each drawing, indicating acceptance of the installation.

4. The HVAC Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings.

C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

1.18 PROJECT RECORD DOCUMENTS:

A. Each Contractor shall record clearly, neatly, accurately, and promptly as work progresses the following data:

1. Changes made resulting from change orders or instructions issued by the Architect.

2. Changes in routing made to avoid conflict with other trades or structural conditions.

3. Final location of equipment and panels if different than contract documents.

B. Upon completion of the project submit to the Architect a set of electronic media noting "as built" conditions indicating all variations and deviations of his work from contract documents.

1.19 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems installed. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the Contract Price.

B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders, indexed, containing the following:

1. Complete shop drawings of all material and equipment of this section.

2. Operation descriptions of all systems.
3. Names, addresses and telephone numbers of all suppliers of system components.
4. Preventative maintenance instructions for all systems.
5. Spare parts list of all system components.
6. Copies of all valve charts.

1.20 PROTECTION

A. Protect all work and material from damage by work and workmen, and accept liability for all damage thus caused.

B. Be responsible for work and equipment until finally inspected, tested, and accepted. Protect work against theft, injury or damage; and carefully store material and equipment received on site, which is not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

C. All openings in stored & installed ductwork shall be covered & sealed when not in use to prevent contamination from dust & debris.

1.21 SCAFFOLDING, RIGGING AND HOISTING

A. Provide scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of material, equipment and apparatus furnished under this division. Remove same from premises upon completion of work.

B. Coordinate propose routing with architect prior to rigging and protect all existing building components against damage.

1.22 MATERIALS AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.

B. Furnish the services of an experienced foreman who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welder, helpers, and labor required to unload, transfer, erect, connect, adjust, start, operate, and test each system.

C. All equipment and materials shall be installed in strict accordance with the manufacturer’s recommended installation instructions as well as UL Listing instructions and all Local, State and National codes.

1.23 ACCESSIBILITY

A. Assure and be responsible for the adequacy of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of the work. Cooperate with all other trades whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.

B. Locate all equipment, which must be serviced, operated, adjusted or maintained fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, filters, dampers, starters, coils, fire dampers, smoke dampers and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility, and the engineer shall approve any change.

C. Provide access panels for installation in concrete block walls or gypsum wallboard ceilings and partitions in locations, which require access for service to the items located behind the permanent gypsum wallboard or concrete block finish.

D. Access panels shall be installed where required to gain access to valves, dampers, controls, etc. Panels shall be flush, insulated, contain continuous steel hinge and screwdriver operated latch. Panels shall be rated equal to the assembly that they are being installed in panels shall be UL listed.

E. Access panels located in fire rated partitions shall be fire panels. The frame and panel assembly of these fire panels shall be manufactured under the Factory Inspection Service of the Underwriters' Laboratories, Inc., and shall bear a label reading: "Frame and Fire Panel Assembly, Rating 2 hours. (B) Temperature Rise 30 Minutes, 250° F. Maximum." Rated panels shall be equipped with automatic closing mechanism and be self-latching.

F. Panels shall be provided with screwdriver operated flush cam locks.

G. Panel size shall be 12 inches x 12 inches except furnish a larger size if required to service a particular item. The exact location and size of each access panel shall be reviewed with, and approved by, the Engineer.

H. The exact location and size of each access panel shall be noted on a shop drawing and reviewed with, and approved by, the Architect and Engineer in writing prior to installation.

1.24 CUTTING AND PATCHING

A. Provide all cutting and patching necessary to install the work specified in this division. Patching shall match adjacent surfaces.

B. At floor slabs & wall openings to be cored drilled or cut, contractor shall find and mark on both faces all reinforcing, rebar, conduits, utilities, etc.. by means of x-ray, pach-ometer or prof-ometer. Submit sketch showing locations of all findings and proposed cuts or cores for review.

C. No structural members shall be cut without the approval of the Structural Engineer, and all such cutting shall be accomplished in a manner directed by the Structural Engineer.

1.25 GROUNDING

A. All components of mechanical piping systems shall be properly grounded to building ground. Where ground path is interrupted by non-conductive materials, appropriate bonding or grounding to building ground shall be provided.

1.26 WATERPROOFING

A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Architect before work is started. Furnish all necessary sleeves required.

1.27 REBATES

A. The contractor shall make the owner aware of all applicable “upstream” energy rebates available for this project.

B. The contractor shall provide the owner all necessary information and documentation for completion and submission of energy rebate applications.

PART 2: PRODUCTS

2.1 IDENTIFICATION, MARKING AND TAGGING

A. Systems and equipment to be identified and marked and valves tagged include, but are not

limited to the Heating, Air Conditioning & Ventilating systems.

B. Submit samples of marking and tagging devices and wording, lettering and numbering scheme for each system.

C. Equipment Identification:

1. Manufacturer's nameplates or trademark shall be permanently affixed to all equipment and materials furnished under this division. Manufacturer's nameplates shall include all pertinent data relative to the piece of equipment including model number, serial number, and operating characteristics as applicable.

2. Separate Equipment Identification Markers shall identify each item of equipment with a permanently attached marker indicating designation and/or number corresponding to design documents.

3. Markers shall be of rigid black Bakelite or phenolic construction with white engraved or incised letters.

4. Lettering on equipment markers shall be of adequate size to be legible from floor levels. In all cases marker lettering shall no be less than 1 inch high.

2.2 SUPPORTS & ATTACHMENTS

A. Provide all necessary supports and bases required for all equipment, piping and for all other equipment furnished under this contract. Submit shop drawings to the Architect for approval before purchase, fabrication or construction of same.

B. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are not strong enough shall be replaced as directed.

C. Vibration Isolation: All mechanical equipment, piping and ductwork shall be mounted on vibration isolators/inertia bases to prevent the transmission of vibration and mechanically transmitted sound to the building structure.

1. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.

2. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

2.3 ELECTRIC MOTORS/STARTERS/VARIABLE FREQUENCY DRIVES

A. Electric motors and starters shall conform to requirements of the AIEE, NEMA, UL, and NEC and shall be suitable for load duty, voltage, phase, frequency, service and location required. Provide inverter duty rated motors for use with variable frequency drives. Provide shaft grounding rings for all VFD controlled motors.

B. All motors shall be rated at 85% power factor at full rated load. Motors less than 85% power factor shall be corrected to 90% power factor at the factory. All motors shall be rated high efficiency.

C. Starters shall be Cerus International or equal.

1. Enclosed Non-Combination Starter

a) Motor Starter shall be enclosed in a Type 1 or Type 4 UL rated enclosure.

b) Motor Starter shall be rated for NEMA class B motors for AC-3 switching and AC-4 switching.

c) Controls and annunciation shall include Hand- OFF- Auto keypad. LED indication shall include Hand, Off, Auto, Run and Overload. Overload reset shall be available.

d) Control inputs shall include: Auto Wet input, Auto Dry input, Permissive Auto input, Damper Status Input and Override Input. Automatic control inputs shall be capable of accepting a transistorized input without the need for interposing relays. Wet control inputs shall accept AC or DC inputs from 10 to 138VACor DC.

e) Damper control shall be built into the starter to provide 24VAC or 120VAC damper control and monitoring.

f) Override input shall disable the starter from operating in either Hand or Auto mode.

g) Protective Functions

(i) Electronic Overload shall provide phase failure and phase loss protection, stall, and class 1 - 30 selectable overload protection. Phase failure protection shall initiate when phase loss is greater than 70% for 3 seconds or phase unbalance is greater than 50% for more than 5 seconds.

(ii) Cycling fault protection shall be integral to the starter. Cycling fault shall be enabled whenever the starter is cycled more than 1000 times in a one hour period. This feature shall be selectable to be disabled. Cycling fault shall cause overload LED to blink rapidly.

2. Enclosed Combination Starter

a) Enclosed combination starter shall include all of the above descriptions in addition to either a motor circuit protector with lock-out mechanism, a UL 508 breaker, or a fused disconnect with lock-out mechanism.

b) The Motor Circuit protector shall be a UL listed 508 manual motor starter with magnetic trip elements only. The breaker and shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides an interrupting rating for the breaker and contactor combination.

c) Fused disconnect shall be UL 98 suitable for service entrance protection.

d) UL 508 breaker shall include thermal and magnetic trip mechanisms.

2.4 USE OF INSTALLATION

A. The Owners shall have the privilege of using any part of the installation when sufficiently complete, but such use thereof, or partial or final payment shall not be considered as an acceptance of such work in lieu of a written certificate from the Engineer.

2.5 DUCTWORK

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, supports and sealing for operating pressures indicated.

B. Duct gauge shall be as required by SMACNA Duct Construction Standards taking into account duct size, supports, pressure rating, and any other relevant parameters. All ductwork, regardless of SMACNA Standards, shall be no thinner than 26 gauge.

C. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having G90 zinc coating of in conformance with ASTM A90.

1. Sealant: As recommended by manufacturer specifically for sealing joints and seams in ductwork.

2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

3. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

D. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

E. Flexible Ductwork: Duct shall be Flexmaster Type 4 Insulated Duct as manufactured by Buckley Associates or approved equal.

1. Flexible duct (insulated) shall be Underwriters Laboratory Listed (UL 181 Class I Connector) and constructed in accordance with NFPA Standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.

2. Duct fabric shall be of a smooth airtight polymer film mechanically locked to the outside helix. (Use of adhesives to lock to fabric in place is unacceptable.) The helix is constructed of corrosive resistant galvanized steel, formed and mechanically locked to the duct fabric on the outside to prevent tearing of the flexible duct.

3. Insulated flex shall have a fire retardant polyethylene outer jacket with a 1/2 lb. density, 1-1/2” thick fiberglass insulation blanket, factory wrapped.

4. The flexible duct shall be supported as required to prevent sagging. Flexible duct with excessive sagging will not be approved.

5. Flexible ductwork shall be rated at 6” positive pressure and 10” negative pressure for sizes up to 12”. Negative pressure for 14” to 16” shall be 5”. Negative pressure for 18” shall be 1”.

6. Length of installed flexible duct shall not exceed 6’-0” in developed length.

F. Flexible Connections

1. Flexible connections shall be provided where a fan connects to a duct or casings to prevent transmission of vibration to ductwork.

2. Flexible connections shall fit tightly around ducts and fans and be securely bolted or clamped in place. Taping shall not be allowed.

3. Flexible duct connections shall be 6” long and made of straight, waterproof, flame retardant fabric having a flame spread rating of not over 25 and a smoke development rating of not over 50

G. Volume Dampers:

1. Provide Young Regulator manual adjustable rectangular opposed blade dampers for duct heights less than 12” with factory-installed locking hand quadrants extended 2” for all dampers installed in externally insulated duct:

a) On each supply, return and general duct take-off.

b) At each take-off to register, grille or diffuser (not all are shown on drawing).

2. Dampers are manufactured approximately 5/16” smaller in width and 1/8” smaller in height than size of duct in which they are installed; e.g., nominal damper size is 24” x 10”; actual size is approximately 23-11/16” x 9-7/8”.

3. Damper frame shall be constructed of #6063 extruded aluminum reinforced channel with minimum thickness of .050”. Opposed damper blades shall be #6063 extruded aluminum with minimum thickness of .050” and shall include reinforcing ribs. Each blade shall be supported in the damper frame by individual Teflon axle bearings, and shall be driven by stainless steel connecting slide linkage controlled by 3/8” square steel control shaft.

4. Note: All required volume dampers may not be indicated on drawings but dampers shall be provided as necessary for systems balancing.
5. Dampers 12” and larger in height shall be opposed multi-blade equal to Greenheck, Nailor or Vent Products.
6. Where dampers are inaccessible, use Young Rectangular locking type ceiling regulators and miter gear or worm gear for all horizontal dampers. Bearing coupling for bottom duct control may be used for shaft on vertical blade dampers. The 3/8” rod between ceiling regulator and damper shall be provided by Contractor.
7. Where dampers are to be located above hard ceilings Young Regulator Bowden Cable Control Dampers shall be utilized. Controllers (actuators) shall be of the concealed ceiling type. Controller type, finish & locations to be approved by architect prior to purchase & installation. The cable between the damper and controller shall be provided by the contractor.
8. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to supporting rods. Hem over edges parallel to rods.
9. Brackets shall be galvanized metal, secured to ductwork with sheetmetal screw with locking quadrant arms (see seal class section for additional requirements). Provide 2” handle extension for all dampers on externally insulated ductwork.
10. Note: All required volume dampers may not be indicated on Drawings but dampers shall be provided as necessary for system balancing.
11. Constant Airflow Regulators (CAR Dampers)
    a) Dampers shall solely operate on duct pressure and require no external power supply. Each regulator shall be pre-set and factory calibrated, requiring no field adjustment to the airflows as indicated on the schedule, and shall be rated for use in air temperatures ranging from -25° to 140°F (-32° to 60°C.)
    b) Constant Airflow Regulators shall be capable of maintaining constant airflow within +/- 10% of scheduled flow rates (15% for units 50 CFM or less), within the operating range of 0.2 to 0.8 in. w.g. differential pressure, or 0.6 to 2.4 in. w.g. on high-pressure models (CAR-II-HP), or 0.1 to 0.42 in. w.g. on low-pressure models (CAR-3-LP).
    c) Regulators shall be provided as an assembly consisting of a 94V-0 UL ABS plastic body housed within a round sleeve for mounting in round duct. Each round sleeve must be fitted with a lip gasket to ensure perimeter air tightness with the interior surface of the duct.
    d) All regulators must be classified per UL 2043 and carry the UL mark indicating compliance. All Constant Airflow Regulators will require no maintenance and must be warranted for a period of no less than five years. Constant Airflow Regulators shall be installed in tight ducting systems in accordance with all applicable codes and manufacturer’s instructions.
    e) Provide Model CAR-3 Constant Airflow Regulators by American ALDES Ventilation Corporation or approved equal.

2.6 DUCT INSULATION

A. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes. Where local code conflicts with specifications, the more stringent shall apply.

B. Definitions:

1. Conditioned Space: An area, room or space that is enclosed within the building

thermal envelope and is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors, or ceilings or where they contain uninsulated ducts, piping or other sources of heating or cooling,

2. Unconditioned Space: An enclosed space within a building that is not a conditioned space or a semiheated space. Crawlspaces, attics, and parking garages with natural or mechanical ventilation are not considered enclosed spaces.

C. Supply and Return Air Duct Insulation:

1. Insulation: ASTM C553; flexible, foil faced, noncombustible blanket.
    a) Exposed Conditioned
        (i) Supply Air: No Insulation Required
        (ii) Return Air: No Insulation Required
        (iii) Outside Air: No Insulation Required
    b) Concealed Conditioned
        (i) Supply Air: R-Value of 6.0 installed.
        (ii) Return Air: No Insulation Required
        (iii) Outside Air: R-Value of 6.0 installed.
    c) Unconditioned
        (i) Supply Air: R-Value of 8.0 installed.
        (ii) Return Air: R-Value of 8.0 installed.
        (iii) Outside Air: No Insulation Required
2. Vapor Barrier Jacket:
    a) Kraft paper with glass fiber yarn and bonded to aluminized film.
        (i) Moisture vapor transmission: ASTM E96; 0.02 perms.
        (ii) Secure with pressure sensitive tape.
3. Vapor Barrier Tape:
    a) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

D. Exhaust Ductwork Insulation:

1. Insulation: ASTM C553; flexible, foil faced, noncombustible blanket.
2. Direct Exhaust: No Insulation Required.
3. Upstream of an ERV:
    a) Refer to Supply and Return Duct Insulation.

2.7 INTERIOR DUCT LINER

A. Polymer Foam insulation (EPFI) equal to IMCOA “IMCOSHEET” Engineered Polymer Foam Insulation, 1 inch thick, R = 4.0, closed cell. Insulation shall be installed as required by the insulation manufacturer. Insulation shall be in compliance with NFPA 90 and 90B. Flame spread shall be less than 25 and smoke density less than 50 per ASTM E-84, NFPA 255, UL 723 Class I and UL 181.

B. Duct lining shall be applied in the following locations:

1. 20’ upstream and downstream from all air handling units exceeding 10 tons.
2. 10’ upstream and downstream from all air handling unit of 10 tons or less.
3. 5’ downstream from all other fan powered units including, but not limited to, fan powered ERV boxes.

C. Areas provided with interior duct lining shall also be provided with exterior duct insulation as indicated by these specifications.

2.8 PIPING

A. Refrigerant Piping Copper Tubing: ASTM B280, Type ACR hard drawn.
1. Fittings: ASME B16.22 wrought copper.
2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.
3. Provide all valves and accessories required for complete installation.

B. Plenum Return Applications
1. Where piping is installed in a return air plenum piping shall be plenum rated.
2. PVC and/or PEX piping shall not be allowed in return air plenums.

2.9 PIPING INSULATION

A. Insulation
1. Refrigerant Piping: Flexible closed cell insulation.
2. Plenum Return Applications: All insulation, jackets and accessories shall be rated for use in return air plenums.

B. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes.

C. Minimum Pipe Insulation:
1. Chilled Water/Cold Condensate/Refrigerant: 1-1/2” Thick, ≤ 1-1/2” Nominal Pipe Diameter
2. Chilled Water/Cold Condensate/Refrigerant: 1-1/2” Thick, > 1-1/2” Nominal Pipe Diameter

FLUID	**NOMINAL PIPE DIAMETER**	
	≤1.5”	>1.5”
Chilled Water, Cold Condensate, or Refrigerant	1 1/2"	1 1/2"

D. Condensate Piping
1. All condensate piping, regardless of temperature, shall be provided with insulation.
2. Condensate generated by cooling coils shall be considered Low Temperature Fluid.

E. Fittings: Factory precut insulation inserts, thickness to be same as adjacent. Enclose in premolded, PVC fitting covers.
1. Low Temperature Applications: Fittings and valves shall be wrapped continuously

with wicking material prior to installing insulation to ensure a continuous path for removal of condensation.

F. Jackets:

1. Interior: Factory applied, all service jacket of white Kraft bonded to aluminum foil reinforced with fiberglass yarn and suitable for painting. Longitudinal and butt joints shall be made with factory applied pressure sensitive material.
2. Exterior/Exposed (Low Temperature): Field applied, 20 mil, PVC sheet material.
3. Exterior/Exposed (High Temperature): Field applied, Aluminum sheet material.
4. All jackets exposed to the weather shall be reflective, UV resistant and sealed watertight.

G. Preparation

1. Install materials after piping has been tested and approved.

H. Installation

1. Install materials in strict accordance with manufacturer's instructions.
2. Continue all insulation through penetrations.
3. In piping exposed to view, locate insulation and cover seams in least visible locations.
4. On piping that requires condensation control, (i.e. chilled or cold) insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
5. On piping not requiring condensation control (i.e. steam, condensate hot water) do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.
6. Provide pipe insulation with weatherproof jacket on exterior piping that has heat trace.

I. Supports:

1. All piping shall be supported in such a manner that the insulation is not compromised by the hanger or the effects of the hanger. In all cases, hanger spacing shall be such that the circumferential joint may be made outside the hanger. Cover the evaporating holes with contractor supplied VaporWick Sealing Tape for the length of the metal saddle.
2. Piping systems 3" (75 mm) in diameter or less, insulated with fiberglass pipe insulation, may be supported by placing saddles of the proper length and spacing under the insulation as designated in Owens Corning Pub. 1-IN-14210.
3. For hot or cold piping systems larger than 3" (75 mm) in diameter, operating at temperatures less than +200F (93C) and insulated with fiberglass, inserts such as foam or high-density fiberglass with sufficient compressive strength shall be used to support the weight of the piping system.
4. On vertical runs, insulation support rings shall be used.

J. Accessories:

1. Insulation Bands: ¾ inch wide; 0.015 stainless steel
2. Metal Jacket Bands: ½ inch wide; 0.015 thick aluminum.
3. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.
4. Finishing Cement: ASTM C449.

5. Fibrous Glass Cloth: Untreated; 8oz/sq. yd. Weight.
6. Adhesives: Compatible with insulation.
7. Wick material for wrapping valves and fittings
8. Closure Materials –Sealing Tape, and mastics.
9. Support Materials - Hanger straps, hanger rods, saddles, support high-density blocks, and support rings.
10. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of "Commercial & Industrial Insulation Standards."

2.10 PIPING / EQUIPMENT LOCATED IN AREAS SUBJECT TO FREEZING

A. All piping subject to freezing shall be wrapped with heat trace cable, insulated as per specification and energy code, and in the case of drain piping, maintain a minimum continuous slope of 1%.

B. Where ceiling mounted equipment penetrates into an uninsulated attic space, it shall be covered with blanket insulation meeting minimum building code requirements and done in a manner complying with the equipment manufacturer’s recommendations.

2.11 FIRESTOPPING

A. Provide Firestopping systems for penetrations in fire-resistance-rated assemblies, including both membrane and through penetrations. This contractor shall thoroughly review architectural plans for assembly type and location and shall prepare bid accordingly.

B. Materials and systems shall be designed to meet the requirements of the intended application and shall be installed per manufacturer’s guidelines.

C. Submittals: Provide for review Manufacturer’s product literature and tested assembly for each type of fire protection material including product characteristics, typical uses, installation procedures, performance and limitation criteria.

2.12 DRIP PANS & LEAK DETECTION

A. Drip pans shall be provided where indicated on plans and under all new and existing piping within critical spaces.

B. Drip pans shall be constructed of continuously welded sheet metal. Each section shall be provided with a wire type leak detection sensor compatible with fluids present in piping. Leak detection alarms shall be tied back to Building Management System.

C. Provide new leak detection sensors in all existing drip pans. Tie alarms back to Building Management System.

2.13 SECONDARY DRAIN PANS

A. A secondary drain pan shall be provided under each piece of concealed (above ceilings, in closets, etc.) HVAC equipped which produces condensate.

B. The pan shall have a minimum depth of 1.5” and shall not be less than 3” larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion resistant material. Metallic pans shall have a minimum thickness of not less than 0.0276-inch galvanized sheet metal and non-metallic pans shall have a minimum thickness of not less than 0.0625 inch.

C. The secondary drain pan with a separate drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain

line shall connect to the drain pan at a higher level than the primary drain connection.

D. A secondary drain pan without a separate drain shall be equipped with water level detection device that will shut off the equipment served prior to overflow of the pan

PART 3: EXECUTION

3.1 OPERATING INSTRUCTIONS

A. Instruction to the Owner's Personnel - After completion of all work and all tests and at such times as designated by the Architect, provide the necessary skilled personnel to operate the entire installation until receipt of owners acceptance.

B. During the operating period, instruct the Owner's representative in the complete operation, adjustment, and maintenance of the entire installation.

C. Give at least forty-eight (48) hours advance notice to the Owner to coordinate scheduling of this instructional period.

D. Furnish to the Architect five (5) complete bound sets of typewritten or blueprinted instruction manuals for operating and maintaining all systems and equipment included in the contract. All instruction manuals shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.

E. The above-mentioned instructions shall include the maintenance schedule for the principal items of equipment furnished under this contract.

3.2 MANUFACTURER'S RECOMMENDATIONS:

A. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

3.3 TESTING, ADJUSTING, STARTING UP AND COMMISSIONING

A. Testing: All work must be proved satisfactory. The tests herein specified shall be applied in the presence of, and to the satisfaction of, the Architect before the work is covered, concealed or made inaccessible to testing, repair, correction or replacement. Accommodate the testing operation to the progress of the project as a whole. Correct all defects appearing under test and repeat the tests until all parts of the work have been successfully tested. Apply the specific tests herein described. Present all work for acceptance in clean condition, properly adjusted and in good working order; for instance, all machinery must be quiet, well balanced, and must be in place and reading accurately. All systems, equipment, controls, and devices in this work shall be tested in operation and must prove for their purposes in the judgment of the Architect or his authorized representative. All internal surfaces of all lines and equipment shall be blown or flushed clean. Where pressure tests are specified, the apparatus shall be clean before the tests are applied. Contractor shall provide adequate protection of piping and duct systems to prevent vandalism and/or accidental damage, blockage, etc., that will hinder or prevent proper operation of the finished systems.

1. Provide instruments, pumps, gauges, supplies, equipment, materials, and labor for testing and starting up. Dispose of test water and wastes after test, in a manner approved by all applicable codes.

2. Perform tests which may be required by authorities or agencies in addition to those herein specified.

3. Furnish certified shop test records for all pressure vessels. After installation, test at full operating pressures and temperatures maintained for one hour. Set and test all pressure control, relief and safety devices.
4. Repair or replace all defective work and repeat tests until the particular system and component parts thereof receive the approval of the Architect.
5. The duration of tests shall be as determined by authorities having jurisdiction, but in no case less than the time prescribed in each section of the specifications.
6. Test equipment and systems, which normally operate during seasons of the year during the appropriate season. Perform tests on individual equipment, systems and their controls. Whenever the equipment or system under test is interrelated with and depends upon the operation of other equipment, systems and controls for proper operation, function, and performance; the latter shall be operated simultaneously with the equipment of system being tested.

B. Adjusting, Balancing and Starting Up

1. Flush clean all systems prior to starting up the system. Any damages to the building or system components caused by failure to clean the systems properly shall be corrected to the satisfaction of the Architect or his authorized representative at no additional cost to the Owner.
2. In duct and piping systems, eliminate all noise and vibration and take all measures to secure proper circulation.
3. Run motor-driven equipment continuously for at least two hours in the presence of the Architect. Correct all defects of noise, vibration, alignment and balance. Replace all motors, which overheat or are noisy.
4. Balance systems completely for temperature, volume, and pressure per NEBB performance standards. Balancing subcontractor shall provide proof of certification by NEBB.
5. Air and water volumetric flow rates shall be within ten (10) percent of those specified. Air and water quantities and pressures shall be tested, balanced and recorded at all terminal devices. Volumetric flows and pressures shall be recorded on suitable forms and submitted for approval.
6. Provide any and all labor and equipment necessary to properly balance the installation including but not limited to dampers, valves, flow stations, test ports, sheaves, belts, etc.
7. All sequences of the system shall be checked and all temperature controls operated and commissioned as required to insure that all systems operate per Engineers intent.

C. Commissioning

1. This Contractor shall provide the deliverables to the engineer/owner.
2. Copies of all records shall be provided to the Engineer by this Contractor including, but not limited to:
    a) Equipment manuals including the name of at least one service agency;
    b) Testing and Balancing reports;
    c) Functional performance testing of the equipment, controls, economizers, and lighting control systems.
3. All commissioning shall be performed as indicated here and elsewhere in the specifications and shall comply with provisions of the applicable Energy Conservation

Code.

4. Start-up shall be provided by factory representatives and a full start-up report shall be provided for review and approval for the following equipment:
    a) Energy Recovery Units
    b) Variable Refrigerant Flow (VRF) Systems

3.4 SEQUENCE OF OPERATIONS

A. Sequence of Operations: This is a performance-based specification intended to convey the control intent of the various systems. The contractor shall provide detailed shop drawings including P&ID diagrams, equipment lists and finalized sequences for review by the Engineer prior to installation. Any questions concerning specific details shall be referred to the engineer for clarification.

B. System: It is the intent of this specification that complete stand alone controls be provided for each mechanical system to provide the sequences noted.

C. Variable Refrigerant Flow (VRF) systems shall be provided with a central factory controller which shall control and monitor all indoor and outdoor units associated with the VRF and ductless split systems. System shall allow for scheduling, set point limiting, and changing set points.
    1. Provide additional sub controllers as required to accommodate the total number of pieces of associated equipment scheduled.
    2. System shall be web enabled to allow access through a networked PC, tablet, or other mobile device.

D. Equipment and Wiring: This contractor shall provide all control equipment, and wiring (regardless of voltage) to accomplish the sequence of operations as detailed below. This contractor shall carry funds sufficient to hire the Electrical Contractor to provide line-voltage power, including any required wiring, breakers, and/or disconnects, to all control's components needing such power. Such components shall include, but may not be limited to:
    1. Control Transformers
    2. Central Equipment Controllers
    3. Line-voltage Thermostats or other sensors

E. Control and Monitoring: Sensors shall be provided throughout the HVAC systems (hydronic and air) as required to control and monitor their operation **and verify performance at BMS**. Provide sensors with remote mounted stats where indicated on the drawings. Where multiple space mounted sensors are required for a given unit they shall be located in the same general area.

F. Safety Controls: This contractor shall provide all safety controls required to protect the building and all controlled equipment from damage as well as those controls necessary to signal abnormal operation or malfunction of equipment. These shall include but not be limited to high limits, low limits, freezestats, flow switches, interlocks and relays.

G. Energy Efficiency: All controls and sequences shall be configured to provide maximum energy efficiency while maintaining occupant comfort.

H. Functional Performance Testing: The contractor shall perform complete and thorough Control Functional Performance Test (FPT) and Commissioning of the control systems. Upon completion of the FPT, a report shall be submitted to the engineer for review and comment. The FPT shall include testing of:
    1. Safeties in every mode, i.e., in manual run mode as well as auto mode.

2. Signals to and from the fire alarm, security and entry systems.
3. Sequences of operation step by step in every mode and possible situation.
4. The operation of all control loops under actual operating conditions.
5. The interlocked operation of all equipment (i.e., the operation of starters in manual and off modes as well as auto mode, damper end switch interlock, etc.)
6. Commissioning should test every conceivable life safety scenario and every conceivable operational scenario that the system will encounter and document this testing with printed graphs of trend logs.

I. Variable Refrigerant Volume (VRV) System:

1. General: System shall be capable of providing simultaneous heating & cooling.
2. VRV Heat Pump (outdoor unit): Unit shall fully modulate its refrigerant flow and condenser fan speed in order to match the heat rejection requirements of the system.
3. BC Controller: Unit shall deliver refrigerant to each terminal unit based on individual units heating or cooling requirements.
4. Terminal Unit (FC):
    a) Occupied: Fan shall run continuously. Unit shall cycle its refrigerant flow to maintain the space temperature as sensed by the space mounted temperature sensor.
    b) Unoccupied: Fan shall be de-energized. On a call for heating or cooling from the space mounted temperature sensor the unit shall cycle its refrigerant flow to maintain the space temperature. When the sensor is satisfied the unit shall de-energize.

J. Energy Recovery Ventilator (ERV):

1. Occupied: Supply & exhaust fans shall run continuously in the occupied mode.
2. Unoccupied: Supply and exhaust fans shall be de-energized in the unoccupied mode.

K. Ductless Split System A/C

1. Cooling: In the cooling mode, the supply fan shall run and the refrigeration circuit shall be energized and cycle to maintain the cooling setpoint of the space/unit mounted temperature sensor. When the cooling setpoint is reached, the reverse shall occur.
2. Heating: In the heating mode, the supply fan shall run and the electric heat shall energize to maintain the heating setpoint of the space/unit mounted temperature sensor. When the heating setpoint is reached, the reverse shall occur.
3. Dehumidification: Upon sensing a rise in humidity, the cooling circuit shall energize and the electric heat shall cycle to maintain space temperature.
4. Provide low ambient controls.

L. Gas Detection System

1. Control Panel
    a) The control panel shall provide continuous monitoring of the designated gas levels in the assigned area and control the ventilation system via digital outputs in accordance with all applicable codes and standards.
    b) The control panel shall have the ability to interface with the building management system via as applicable:

(i) Analog or digital outputs to any compatible electronic analog control, DDC/PLC control or automation system.

(ii) Upward communication via BACnet communication protocol to any compatible electronic control, DDC/PLC control or automation system.

c) The control panel shall have the capability to accept any combination of 4-20 mA transmitters provided by INTEC Controls (a Relevant Solutions brand).

d) The control panel shall accept up to twenty (20x) analog inputs with four (4) digital inputs. Each analog input can have five (5) trip/set-points.

e) There shall be five (5) relay outputs for every four (4) analog inputs and two (2) independent 4-20 mA outputs available. The outputs shall be programmable in the field. Each of the sensing points is readily addressable to either of the (2) analog outputs by selecting the Minimum, Maximum, or Average value.

f) The alarm shall be acknowledged by an external manual reset switch via the digital input or through the control panel menu.

g) The control panel shall have status indicator LED's located on the front; Red = Fail, Yellow = Alarm.

h) The control panel shall include a two line, backlit LCD display of 16 characters, at 1 digit resolution.

i) The controller shall be NRTL performance tested and certified to ANSI/UL 2017.

j) The contractor shall supply the PolyGard® Series MGC2-20 analog controller, by INTEC Controls or approved equal.

k) Provide quantities as indicated on the plans.

2. Carbon Monoxide (CO) Sensor/Transmitter

a) The carbon monoxide sensor/transmitter shall provide monitoring of the carbon monoxide levels in the parking garage and control the ventilation system via the control panel in accordance with all applicable codes and standards.

b) The sensors shall be electrochemical type. The sensor/transmitter shall have plug-in technology for ease of troubleshooting and replacement of both the element and the printed circuit board. Solid-state sensing devices shall not be acceptable.

c) The sensor range shall be 0-250 ppm carbon monoxide. A microprocessor-based transmitter shall generate a proportional 4-20 mA output signal. The wiring between the transmitter and the control panel shall be a 2-wire, twisted and shielded, 4-20mA, 17-28 VDC configuration. Each sensor/transmitter shall cover between 5,000 and 10,000 square feet of the garage floor and placement shall be applied strategically and appropriately per floor plan requirement.

d) The sensor shall have stability and resolution of ± 3 PPM of reading, repeatability of ± 3% of reading, and a response time of 50 seconds to a 90% step change. The long-term output drift shall not exceed more than 0.4% of signal loss per month. The permissible ambient working temperature shall be 14°F to 122°F (-10°C to 50°C) and permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. Its life expectancy shall be 5

years of normal service. The manufacturer shall provide a two 2-year warranty for materials and workmanship, and a 12-month warranty on the sensing element under normal exposure.

e) The sensor/transmitter printed circuit board shall have the capability of adding up to (2) alarm relays with individual setpoints for local control or status indication.

f) The sensor/transmitter shall be contained in a NEMA 4X metal enclosure. The enclosure for the sensor/transmitter shall be installed on walls or columns approximately 5 feet above the floor.

g) The output signal from the sensor/transmitter shall be a direct input to the control panel. All sequences of fan and alarm control, including time delay functions to prevent hunting of ventilation fans shall be a part of the control panel.

h) If the level of Carbon Monoxide reaches 25 PPM in the area of detection, the low alarm shall activate and the exhaust fans will be started. If the level of CO increases to 100 PPM, the high alarm shall activate.

i) The sensor/transmitter shall be NRTL performance tested and certified to ANSI/UL 2075.

j) The contractor shall supply the PolyGard® Series LC-1112 CO sensor/transmitter, by INTEC Controls or approved equal.

k) Quantities & locations indicated on the plans shall be verified by the sensor manufacturer prior to procurement.

3. Nitrogen Dioxide (NO2) Sensor/Transmitter

a) The Nitrogen Dioxide sensor/transmitter shall provide monitoring of the Nitrogen Dioxide levels present in diesel exhaust in the parking garage and control the ventilation system via the Control panel in accordance with all applicable codes and standards.

b) The sensors shall be electrochemical type. The sensor/transmitter shall have plug-in technology for ease of troubleshooting and replacement of both the sensing element and the printed circuit board. Solid-state sensing devices shall not be acceptable.

c) The sensor range shall be 0-10 ppm Nitrogen Dioxide. A micro-processor-based transmitter shall generate a polarity protected, proportional 4-20 mA output signal. The wiring between the transmitter and the Control panel shall be a 2-wire, twisted and shielded, 4-20mA, 17-28 VDC configuration. Each sensor/transmitter shall cover between 4,000 and 6,000 square feet of the garage floor and placement shall be applied strategically and appropriately per floor plan requirement.

d) The sensor shall have an accuracy and resolution of ±0.1 PPM of reading, repeatability of ±2% of reading, and a response time of less than 40 seconds to a 90% step change. The sensor drift shall not exceed more than 2% signal loss per month. The permissible ambient working temperature shall be 14°F to 104°F (-20°C to 40°C) and the permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. Its life expectancy shall be 2 years of normal service. The manufacturer shall provide a two 2-year warranty for materials and workmanship, and a 12-month warranty on the sensing element under normal exposure.

e) The sensor/transmitter shall be contained in a NEMA 4X enclosure. The

enclosure with the sensor/transmitter shall be installed on walls or columns between 5 ft. and 6 feet above the floor.

f) The sensor/transmitter shall have the capability of adding up to (2) relays as a separate component to the printed circuit board of the sensor.

g) The output signal from the sensor/transmitter shall be a direct input into the digital control building automation system. All sequences of fan and alarm control, including time delay functions to prevent hunting of ventilation fans shall be a part of the Control panel.

h) If the level of NO2 reaches 2 PPM, the low alarm shall activate. If the level of NO2 increases to 5 PPM, the high alarm shall activate.

i) The contractor shall supply the PolyGard® Series AT-1130 NO2 sensor/transmitter, by INTEC Controls or approved equal.

j) Quantities & locations indicated on the plans shall be verified by the sensor manufacturer prior to procurement.

4. Sequence

a) System 1 (Service Drive)

(i) Upon activation of the Low Alarm Level (LAL) EF-2 shall energize and the Motorized Dampers associated with RH-1 & 2 shall open. Upon deactivation of LAL the reverse shall occur.

(ii) Upon activation of the High Alarm Level (HAL) the system shall provide an audible and visible alarm in the space(s) being monitored. Manual reset shall be required.

M. VRF Refrigerant Leak Detectors

1. Provide a mounted stationary refrigerant gas leak sensor to alarm at specified level of refrigerant gas in the area where refrigerant gas is most likely to accumulate. The unit shall be recessed in the wall in a standard 2-gang electrical box. self-contained with sensing element, alarm horn and relay contacts.

2. The local alarm shall be activated within the occupied space once the detected refrigerant level exceeds the threshold. The alarm shall provide an audible horn at 83dB at 10 feet and visual LED indication.

3. The unit shall meet the following:

a) Non-Dispersive Infrared sensing element for R410 refrigerant.

b) Multicolored LED status indication: Green Blinking / Warm-up, Green Fixed / Normal status, Yellow / Fault, Red Blinking / Alarm.

4. Monitor shall be the SensAC VRF leak detector by Unlimited Controls or approved equal.

END OF SECTION

SECTION 260000
ELECTRICAL REQUIREMENTS

PART 1 – GENERA

1.1 RELATED SECTIONS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
B. This Contractor shall also include allowances for startup and for making the systems fully operational, and for scope and design contingencies. Future changes in price for items not shown on these drawings will not be allowed if the system itself is shown on these Drawings.
C. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.
D. The drawings show the layout of the electrical systems and indicate the approximate locations of outlets, apparatus, and equipment. The runs of feeders and branches as shown on the drawings are schematic only. The exact routing of branch circuits and feeders shall be determined by the structural conditions and possible obstructions. This shall not be construed to mean that the design of the systems may be changed but refers only to exact runs between given points. The Engineer reserves the right to revise the drawings from time to time to indicate changes in the work.
E. The Contractor shall consult and review all contract and reference drawings which may affect the location of any outlets, apparatus and equipment to avoid any possible interference and permit full location of outlets, apparatus and equipment up to the time of rough-in is reserved by the Engineer and such change shall be made without additional expense to the Owner.
F. It shall be the responsibility of this Contractor to see that all electrical equipment such as junction and pull boxes, panelboards switches, controls and such other apparatus as may require maintenance and operation from time to time is made accessible. Although the equipment may be shown on the drawings in certain locations, the construction may disclose the fact that such locations do make its position accessible. In such cases this Contractor shall call the attention of the Engineer to the condition before advancing the construction to a state where a change will reflect additional expense to the Owner.

1.2 SUMMARY

A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 1.
B. These documents have been prepared with the intention that they call for finished, tested work, in full operating condition and complete with necessary accessories.
C. The contract drawings are generally diagrammatic and convey the scope of work and general arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect/Engineer before being installed. The Contractor shall follow the drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer

and/or Architect, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

D. These contract documents are complementary. What is called for by one shall be as binding as if called for by all. Materials or work described in words, which have well-known technical, or trade meaning shall be held to refer to such recognized standards. Incidental devices and accessories needed for complete, operational systems shall be provided even though they may not be indicated or identified in the documents.
E. If apparatus have been omitted, notify the Architects/Engineers of such belief. It is understood that bidder has included all required items and work in his bid, and will not if bid is successful, claim extra compensation for furnishing a complete and satisfactory system. If a particular item is called for or specified more than once in these contract documents, the higher grade shall be considered specified.
F. Should it appear that the character of the work is not sufficiently explained in these specifications or on the drawings, apply to the A/E for further information. Conform to the A/E's decision and directions as shall become part of these contract documents. The A/E reserves the right to be sole interpreter of the drawings and specifications, and all decisions shall be conclusive, final and binding on the parties.
G. Materials called for in these documents shall be new, unused equipment and of the latest recognized standards.
H. The work to be done under Division 16 is shown on the electrical drawings.

1.3 OUTLINE SCOPE OF WORK

A. The work under this contract, without limiting the generality thereof, includes all materials, labor, equipment, services, and transportation, unless otherwise specified, necessary to complete all systems of electrical wiring and equipment required by the drawings and/or as specified herein. It is the intent of this section and accompanying electrical drawings that these systems be furnished complete in every respect. The Electrical Contractor shall furnish all wiring, equipment and labor needed for a complete operating installation.
B. The Electrical Contractor shall fully indemnify the Owner against any damages, removals and alteration work. This is in addition to the requirements of the General Conditions of the Specifications.
C. The Electrical Contractor shall review architectural, interior design and all other trades plans, elevations and details prior to any work and identify any conflicts between furnishings, furniture, art-work, molding, casework, televisions, signage, awnings, canopies, diffusers, fixtures, etc.. and electrical, fire alarm, audio/visual and communications devices shown on the electrical plans and details. The Electrical Contractor shall prepare 8.5” x 11” sketches showing the conflicts and submit to the Architect for resolution prior to any work. Failure of the electrical contractor to coordinate, identify and obtain a field-directive on any conflict herein noted, that results in installed electrical work to be relocated to the Owner/Architects liking shall be the sole-responsibility of the Electrical Contractor. The Electrical Contractor shall assume and cover all costs associated with conflicts not coordinated, identified and submitted to the Architect, inclusive of material, labor, overtime pay, etc.. and shall not affect the project schedule.

1.4 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 25 for rough-in requirements.

1.5 SURVEYS AND MEASUREMENTS

A. Base measurements, both horizontal and vertical, on established bench marks. Work shall agree with these established lines and levels. Verify measurements at site and check the corrections of same as related to the work.
B. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the A/E.

1.6 EXAMINATION OF SITE

A. Prior to submitting bid, visit the site where the work is to be performed and the materials are to be delivered. Failure in this respect shall not excuse the Contractor from his obligation to supply and install the work in accordance with the plans and specifications and under all conditions, as they exist.
B. By submitting a bid, this Contractor warrants that all specification sections and drawings showing equipment for plumbing, heating, ventilation, air conditioning, electrical, and architectural, have been examined and is familiar with the conditions and extent of work affecting this contract.

1.7 EQUIPMENT AND MATERIALS

A. All equipment and materials for permanent installation shall be the products of recognized manufacturer's and shall be new, unless noted for re-use, without damaged, functional or aesthetic components.
B. New equipment and materials shall:
    1. Be Underwriters Laboratories, Inc. (UL) labeled and/or listed where specifically called for, or where normally subject to such UL labeling and/or listing services
    2. Be without blemish or defect.
    3. Be in accordance with the latest applicable NEMA standards.
    4. Be products, which will meet with the acceptance of the agency inspecting the electrical work. Where such acceptance is contingent upon having the products examined, tested and certified by UL or other recognized testing laboratory, the product shall be so examined, tested and certified.
C. For all equipment, which is to be installed but not purchased as part of the electrical work, the electrical work shall include:
    1. The coordination of their delivery.
    2. Their unloading from delivery trucks driven in to any point on the property line at grade level.
    3. Their safe handling and field storage up to the time of permanent placement in the project.
    4. The correction of any damage, defacement or corrosion to which they may have been subjected.
    5. Their field make-up and internal wiring as may be necessary for their proper operation.
    6. Their mounting in place, including the purchase and installation of all dunnage, supporting members and fastenings necessary to adapt them to architectural and structural conditions.

D. Equipment, which is to be installed but not purchased as part of the electrical work, shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The electric work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.8 ELECTRICAL INSTALLATIONS

A. All materials and labor called for, specified in Division 16 of the specifications, and or shown on the electrical drawings furnished under this contract shall be provided under Division 16 unless called for otherwise in the Division 16 documents. The word “provide” as used in the Division 16 documents, shall mean to furnish, install, connect up, complete with all accessories ready for operation and warranted.
B. Coordinate electrical equipment and materials installation with other building components. Fully coordinate work with that of other trades. Furnish information in writing that is needed for the coordination of clearances, etc., with the work of others, and such information shall be given in a timely fashion so as not to impede the progress of two or more trades. Confer and resolve the conflict immediately. If so directed by the A/E, prepare composite drawings to resolve any space or clearance conflict.
C. Verify all dimensions by field measurements.
D. Arrange for chases, slots, and openings in other building components to allow for electrical installations.
E. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
F. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
G. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.
H. Where mounting heights are not detailed or dimensioned, the exact location shall be determined by the A/E, install electrical services and overhead equipment to provide the code and/or utility requirements.
I. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
J. Coordinate the installation of electrical materials and equipment above ceilings with suspension systems, mechanical equipment and systems, and structural components.
K. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
L. Attention is directed to areas and items indicated on the drawings by the notations "HOLD", "N.I.C.", "BY OTHERS" and words of similar intent. The work indicated in these areas is shown for information and continuity only. Work or items furnished and installed in these areas solely for the convenience of this Contractor or others, without prior written approval of the Owner, shall be removed at the option of the Owner and at the Contractor's expense.
M. Provide all required staging and scaffolding for all the work under this section.

1.9 ALTERATION WORK

A. Maintain continuity of service in areas where occupancy is to be maintained during alterations. If it becomes necessary to disconnect or interrupt service, obtain written consent of the Owner, and only disconnect service at the convenience of, and with the consent of the Owner. A copy of the written request for a shutdown shall be forwarded to the A/E.

1.10 CUTTING AND PATCHING

A. Cutting and patching of electrical equipment, components, and materials specified under Division 16 (conduit, sleeves, equipment, etc.) shall be performed by Electrical Contractor.
B. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 Section: "Cutting and Patching" for definitions, requirements, and procedures.
C. Cutting and patching of existing structures (thru walls, floors, ceilings, etc.) to accommodate equipment, components, and materials of all Contractors, including Mechanical and Electrical Contractors, shall be performed by General Contractor and/or his designated Subcontractor.
D. Cutting and patching of new structures (thru walls, floors, ceilings, etc.) to accommodate installation of ill-timed work or removal and replacement of defective work or work not conforming to requirements of Contract Documents, shall be performed by General Contractor and/or his designated Subcontractor and costs shall be back charged to appropriate trade Contractor.
E. Do not endanger or damage installed work through procedures and processes of cutting and patching.
F. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installations.
G. Arrange to have ducts, raceways, conduit, panelboards, boxes, and such other pertinent parts, set in place ahead of construction work so that they will be built-in with structures and eliminate need for cutting and patching. Failure to conform to this paragraph will require that this Contractor perform any cutting and patching required for his work at his expense. Cutting shall be neatly finished to match adjoining work in a manner acceptable to the A/E. Cutting and patching shall not affect the fire rating of walls or structural parts. Cutting and patching required to correct work, due to error or negligence of the Contractor, or to defects in his material or workmanship, shall be corrected at no additional cost to the Owner. Patching shall meet or exceed quality of adjacent surfaces. Cutting must be accomplished as not to weaken adjacent structural members and must be approved by the Structural Engineer before proceeding.
H. Perform cutting, fitting, and patching of electrical equipment and material required to:
    1. Uncover work to provide for installation of ill-timed work.
    2. Remove and replace defective work.
    3. Remove and replace work not conforming to requirements of the contract documents.
    4. Remove samples of installed work as specified for testing.
    5. Install equipment and materials in existing structures.
    6. Upon written instructions from the A/E, uncover and restore work to provide for A/E observation of concealed work.
I. Cut, remove and legally dispose of selected electrical equipment, components and materials as indicated, including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by the work.
J. Protect the structure, furnishing, finishes, and adjacent materials not indicated or scheduled to be removed. Protect the electrical work and the work of others in a manner best suited to the particular case. Correct any damage done to any work at no additional cost.
K. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

L. Locate, identify, and protect electrical services passing through areas that are to under-go remodeling or demolition. Electrical services serving other areas required to be maintained, and transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

1.11 SUBMITTALS

A. Within fifteen (15) business days after the date of notice to proceed and before purchasing any materials or equipment, submit for approval a complete list, in six (6) copies, of all materials to be incorporated in the work.
B. Shop drawings/manufacturer's cuts are required for:
    1. Wire & Cable.
    2. Lighting Fixtures.
    3. Panelboards.
    4. Disconnect Switches.
    5. Fire Alarm System.
    6. Wiring Devices and Plates.
    7. Fire Stopping Materials.
    8. Generator & Transfer Switches.
    9. Seismic Restraint Components.
C. After the list has been processed, submit complete shop drawings of all equipment. These shop drawings submittals shall be submitted within thirty days after the processing date of the original submittal.
D. All submittals shall be complete and submitted electronically to all applicable parties. No consideration will be given to partial submittals except with prior approval. No consideration will be given to faxed submittals.
E. Explanation of Shop Drawing Stamp:
    1. Approved: indicates that we have not found any reason why this item should not be acceptable within the intent of the documents.
    2. Approved with Comments: indicates that we have found questionable components which, if corrected or otherwise explained, make the product acceptable.
    3. Resubmit for Final Review: indicates that this item should be resubmitted for approval before further processing.
    4. Does Not Conform: indicates that the item will not meet the intent of the Contract.
F. No shop drawing stamp or note shall constitute an order to fabricate or ship. Such notification can only be performed by the Project Manager for construction, the Contractor scheduling his own work, or the Owner.
G. Submittal of shop drawings, product data, will be reviewed only when submitted by the Contractor. Data submitted from Sub-contractors and material suppliers directly to the A/E will not be processed.
H. If shop drawing is not in compliance after two submissions, a third submission for the same manufacturer will not be considered for review.
I. Check shop drawings and other submittals to assure compliance with contract documents before submittal to A/E.
J. Review of shop drawings is final and no further changes shall be considered without written application. Shop drawing review does not apply to quantities, dimensions, nor relieve this Contractor of his responsibility for furnishing materials or performing his work in full compliance with these contract drawings and specifications. Review of these shop drawings shall not be considered a guarantee of the measurements of this building or the conditions encountered.

K. General requirements for the substitution of equipment and submittal of shop drawings as follows. If apparatus, systems or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, wiring, supports, or construction, it shall be provided by this Contractor at no additional cost to the Owner. This Contractor shall assume all cost and entire responsibility thereof. The approval of substituted equipment does not relieve the contractor of his/her responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist. It is the contractor's responsibility to submit only those items that meet the specified apparatus, systems and material. Should any non-conformance code items be installed, they shall be replaced by this Contractor at no additional cost to the Owner. The construction means and methods used in the project shall be reviewed and approved through the local building department or a deputy inspector to insure compliance with the current codes, project specifications and general building practices.

L. Coordination drawings shall be submitted and shall show all HVAC, Electrical, Plumbing and Fire Protection systems superimposed in order to identify conflicts and ensure inter-coordination of all trades. Coordination drawings shall be initiated under this Section of the Specifications. It is this Contractors responsibility for preparation of project coordination drawings showing the installation of all electrical equipment, switchgear, motor control centers, panelboards, transformers, transfer switches, disconnect switches, enclosed circuit breakers, conduits, outlets, switches and accessories to be provided under this Section of the Specifications. These drawings shall be prepared at not less than 3/8 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. A reproducible copy of each drawing prepared shall then be submitted to the Mechanical, Plumbing and Sprinkler Contractors, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted. After this Contractor has fulfilled his obligation, he shall notify all other Contractors. After each drawing has been coordinated between trades, each trade shall sign each drawing, indicating acceptance of the installation. This Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings. A Subcontractor who fails to promptly review and incorporate his work on the drawings shall assume full responsibility of any installation conflicts affecting his work and of any schedule ramifications. Review of coordination drawings shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, and Electrical Contractors.

1.12 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 for definitions, requirements, and procedures.

B. If materials of equipment are substituted for specified items that alter the systems shown or its physical characteristics, or which have different operating characteristics, clearly note the alterations or differences and call it to the attention of the A/E. Under no circumstances shall substitutions be made unless identical material or equipment has been successfully operated for at least three consecutive years.

C. All substitution made by the Contractor shall require the Contractor to fully coordinate the substitution with other trades. The Contractor must make any modifications required by the substitution at no additional cost to the Owner. In addition the Contractor must notify the A/E

of any changes required and obtain approval for the changes. The review of the shop drawings by the A/E shall not relieve the Contractor from his responsibility as set forth in this specification.

1.13 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of power operated equipment, conduits with pull string, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in a readily accessible location.

1.14 DELIVERY STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
B. Store equipment and materials at the site unless off-site storage is authorized in writing. Protect stored equipment and materials from damage. All devices shall be stored in a locked room. Assume responsibility for the devices until the date of final inspection.
C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.15 RECORD DOCUMENTS

A. As work progresses and for the duration of Contract, maintain a complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design. Work shall be updated on a weekly basis and shall be made available for review by Architect. Failure to perform this work shall be reason for withholding requisition payments. In addition, take photographs of all concealed equipment in gypsum board ceilings, shafts, and other concealed, inaccessible work. At completion of work, make copies of photographs with written explanation on back. These shall become part of Record Documents.
B. At completion of work prepare a complete set of Record As-Built Drawings in AutoCAD, Computer Aided Drafting (CAD) software, showing all systems as actually installed, including all fire alarm and electrical circuitry. The Record As-Built Drawings computer files shall be made available to the Architect, Engineer and Owner prior to final payment.
C. The Architect will not certify the accuracy of the Record Drawings. This is the sole responsibility of the Electrical Contractor.
D. This trade shall submit the record set for approval by the Fire and Building Departments in a form acceptable to the departments, when required by the jurisdiction.
E. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.16 WARRANTIES

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 for definitions, requirements, and procedures.

B. All work and equipment furnished under this Section shall be guaranteed free from defects in workmanship or materials for a period of one (1) year, unless specifically noted otherwise for a particular system, from the date of final acceptance of the systems as set forth in this Contract. The Subcontractor shall replace any defective work developing during this period, unless such defects are clearly the result of misuse of equipment by persons not under the control of the Subcontractor, without cost to the Owner. Where such defective work results in damage to work of other Sections, all such work shall be restored to its original condition by mechanics skilled in the affected trade, at the expense of the Subcontractor. The Subcontractor shall submit a separate written guarantee stipulating the aforesaid conditions.
C. Prior to or at the time of Substantial Completion for the work and during administrative close-out of the project, submit one (1) copy of all specified warranties and guarantees to the Architect for review, approval and subsequent transmittal to the Owner.
D. Warranties and guarantees, including those specified in excess of the general one (1) year guarantee, shall be complete for all specific materials, systems, sub-systems, equipment, appliances and products specified and required by the Contract Document.
E. Warranties and guarantees shall clearly define what is to be guaranteed; the extent, terms, conditions, time and effective dates.
F. Copies of the same warranties and guarantees shall be included in the “Operating and Maintenance Manual” as specified herein.

1.17 CLEANING

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 for definitions, requirements, and procedures.
B. Upon completion of work, the Contractor shall clean, polish and leave bright, fixtures and lamps, and shall remove dust, dirt, debris and loose plaster from panelboards, controls, and switchboards. Unused openings in pull boxes, junction boxes, equipment and raceways shall be capped or closed by an approved means. Replace all inoperative lamps.

1.18 DEFINITION OF TERMS

A. "This Contractor" or "E.C." specifically means, the Electrical Contractor working under this section of the specifications.
B. "Concealed" means hidden, in chases, furred spaces, walls, above ceilings or enclosed in construction.
C. "Exposed" means visible in sight or not installed "concealed" as defined above.
D. "Approved Equal" means any equipment or material which is approved by the Engineer and equal in quality, durability, appearance, strength, design and performance to the equipment or material originally specified.
E. "Conduit" shall mean all conduit including fittings, joints, hangers and supports.
F. "Furnish" shall mean to purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the electrical work.
G. "Install" shall mean to perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the electrical work.
H. "Provide" shall mean to furnish and install.

1.19 QUALITY ASSURANCE

A. Obtain services of manufacturer's representatives of electrical equipment, during erection and construction of their respective equipment to insure proper installation of same.

B. A letter is required from each system manufacturer's representative certifying to the A/E that requirements have been checked and are properly installed and operating.

1.20 PERFORMANCE TESTS - ELECTRICAL

A. Test and adjust the electrical systems and equipment during the progress of the work.
B. Upon completion of work and after preliminary tests to assure that all systems are complete and in proper working order, arrange with the A/E to conduct performance tests of the electrical systems. These tests may be witnessed by the A/E prior to acceptance of systems and shall be arranged for the purpose of demonstrating compliance with contract documents. During this period, visually inspect all electrical equipment. Lighting fixtures shall be tested with specified lamps in place for not less than six (6) hours. Check voltages to assure that all transformer taps are properly set.
C. General operating tests shall be performed under as near design conditions as possible, for a period of not less than one (1) hour for each system, and shall demonstrate that all equipment is functioning in accordance with specifications. Furnish all instruments, ladders, test equipment and personnel required for tests. Any equipment or systems found by test to be deficient or unsatisfactory shall be replaced and tests repeated as often as necessary to assure compliance with contract documents.
D. Test all feeders, sub-feeders and all branch wiring for amperage, voltage, phase balance, phase sequence of A,B,C and insulation resistance, then submit the results of this test to the A/E neatly typed in triplicate for review. This test may be conducted at any time up to, through and including, the guarantee period if requested by the A/E, at no additional cost to the Owner.
E. Phase balance the complete electrical system, phase balance all panels as near as loads will permit under normal working conditions.
F. Test all ground conductors for current flow, as near design operating conditions as possible. If any measured current exceeds one (1) ampere, determine and correct the cause. Also, if measured resistance is greater than 5 ohms indoor or 10 ohms outdoor, determine and correct the cause.
G. During the progress or completion of the work it shall be subject to the inspection of the Owner and to such other inspectors, as may have jurisdiction, including those of the Electric Company, Fire Department and the Telephone Company.
H. The Contractor shall be responsible for correct voltages, tap settings, trip settings and correct phasing on all equipment. Secondary voltages shall be measured at the line side of the main breakers with the breakers in an open position, at panelboards, and at such other location on the distribution systems and branch circuits as directed by the Engineer.
I. At completion of the work, Contractor shall submit to the Owner's representative in writing a statement stating: (1) that the work is complete; (2) that the entire installation is in accordance with the drawings and specifications; (3) that preliminary tests have been made; and (4) that the work is ready for final inspection and test.
J. A final inspection of the installation to determine compliance with the drawings and specifications will be made by the Owner's representative. Work will be checked for quality of materials, quality of workmanship, proper installation and finished appearance. The electrical contractor shall provide the services of the project electrical foreman for inspection purposes. The foreman shall remove and reinstall wiring devices, junction box covers, panelboard trims, switchboard covers, terminal box covers, ceiling tiles, lighting fixtures, etc. as required to facilitate any inspections required by the Owner's representative.
K. The Contractor shall arrange and conduct operating tests on all equipment in the presence of the Owner's representative. The components parts of systems and the various systems shall be demonstrated to operate in accordance with the requirements and intent of this

specification. Any non-complying or defective materials or workmanship disclosed as a result of the inspection and tests shall be corrected promptly by the Contractor, and the tests repeated as often as necessary until approved and accepted by the Owner's representative.

L. The Contractor shall visit the site to acquaint himself with existing conditions. No extra compensation will be paid for failure to comply with this paragraph.
M. The Electrical Contractor shall provide supervision, labor, materials, tools, test equipment, and all other equipment or services and expenses required to test, adjust, set, calibrate, and operationally check work and components of the electrical systems and circuitry throughout this section.
N. The electrical contractor shall pay for all tests including expences incident to retests occasioned by defects and failures of equipment to meet specifications at no additional cost to the owner.
O. Any defects or deficiencies discovered in any of the electrical work shall be corrected at no cost to the owner.
P. All testing shall be compatible with the manufacturer’s installation instructions.

1.21 SEISMIC RESTRAINT

A. It is the intent of this seismic specification to keep all electrical building system components in place during a seismic event.
B. All electrical systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a Conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
C. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. Contractor shall submit a report outlining the structural engineer’s review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.
D. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

1.22 TEMPORARY LIGHT AND POWER

A. Under this Section of the specifications, this Contractor shall provide temporary electric service, sized suitable for construction for each trade. This contractor shall provide all material and labor for temporary electrical service per the local power company’s requirements and standards with all necessary panelboards, disconnect switches, transformers, conduit, wiring, etc. as required. This contractor shall pay all associated costs, up front.
B. Where temporary electrical service cannot be obtained from the local power company, this contractor shall provide a temporary, on-site, electric generator with all necessary panelboards, disconnect switches, transformers, conduit, wiring, etc. as required. The fuel used for the generator shall be provided and paid for by this Contractor.
C. This contractor shall provide a distribution system with circuits for receptacles and lighting as required for construction. This contractor shall maintain the temporary electrical system during construction and remove the system when construction is complete.
D. Under this section of the specifications, this Contractor shall provide and maintain temporary lighting based on using not less than one 100-watt lamp for each 100 square feet of building floor area and one duplex GFCI receptacle for each 200 square feet of building floor area. Where higher lighting intensities are required by Federal or State laws or otherwise specified, the above specified wattage shall be increased to provide the increase intensities.

E. This contactor shall provide temporary power and telephone services from the local telephone company for site trailers, fax machines, computers, etc., per the general contractor's direction.
F. The service shall incorporate ground fault protection and comply with NEC Article 527 and OSHA requirements.

1.23 PERMITS

A. Obtain all required electrical permits and pay all fees for same.
B. Provide to Engineer, in duplicate, a certificate of final inspection from the authority having jurisdiction for the electrical and systems.

1.24 OPERATING, INSTRUCTION, AND MAINTAINANCE MANUALS

A. Refer to Section 01700 – CONTRACT CLOSEOUT for submittal procedures pertaining to operating and maintenance manuals.
B. Each copy of the approved operating and maintenance manual shall contain copies of approved shop drawings, equipment literature, cuts, bulletins, details, equipment and engineering data sheets and typewritten instructions relative to the care and maintenance for the operation of the equipment, all properly indexed.

1.25 BIDDERS REPRESENTATION

A. By the act of submitting a bid for the proposed contract, the Bidder represents that:
    1. The Bidder and all subcontractors the Bidder intends to use have carefully and thoroughly reviewed the drawings, specifications and other construction contract documents and have found them complete and free from ambiguities and sufficient for the purpose intended; further that,
    2. The Bidder and workmen, employees and subcontractors the Bidder intends to use are skilled and experienced in the type of construction represented by the construction contract documents bid upon; further that,
    3. Neither the Bidder nor any of the Bidder's employees, agents, intended suppliers or subcontractors have relied upon any verbal representations, allegedly authorized or unauthorized from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that,
    4. The bid figure is based solely upon the construction contract documents and properly issued written addenda and not upon any other written representation.

1.26 UTILITY COMPANY & AGENCY COORDINATION

A. This section includes, but is not limited to coordination with the following utilities, agencies and authorities having jurisdiction:
    1. Power Company: This Contractor shall coordinate with the local utility power company and provide all material & labor required to comply with the utility power company's requirements and standards, prior to ordering any electrical equipment, such as, switchgear, panels, transformers, disconnect switches, SPD, etc. This Contractor shall confirm metering sequence (hot or cold) and make the appropriate provisions and/or changes for the utility companies approved metering sequence arrangement. Notify Engineer of discrepancies between the plans and the local utility company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the utility company, but corrections shall be made. All A.I.C. ratings,

grounding, bonding, concrete pads & curbs, protective bollards, raceways, ductbank, manholes, etc., shall be in accordance with the utility company's standards.

2. Telephone Company: This Contractor shall coordinate with the local telephone company and provide all material & labor required to comply with the telephone company's requirements and standards, prior to ordering any electrical or telephone equipment, such as, terminal boards, grounding systems, raceways, ductbanks, manholes, etc. This Contractor shall confirm the telephone company's requirements and provide as necessary. Notify Engineer of discrepancies between the plans and the telephone company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the telephone company, but corrections shall be made.
3. Cable TV Company: This Contractor shall coordinate with the local cable TV company and provide all material & labor required to comply with the cable TV company's requirements and standards, prior to ordering any electrical or cable TV equipment, such as, terminal boards, grounding systems, raceways, ductbanks, manholes, etc. This Contractor shall confirm the cable TV company's requirements and provide as necessary. Notify Engineer of discrepancies between the plans and the cable TV company's standards. No extra compensation will be given for corrections required for failure to coordinate with the cable TV company, but corrections shall be made.
4. Local Fire Marshal: This contractor shall verify with the local fire alarm official, the type of master-box or municipal connection required for this project. This contractor shall provide all material & labor to comply with the local municipality. Notify Engineer of discrepancies between the plans and the municipality's standards. No extra compensation will be given for corrections required for failure to coordinate with the municipality, but corrections shall be made.
5. Electrical Inspector: Review plans and specifications with the local electrical and/or wiring inspector(s). Obtain and pay for all permits.
6. Building Inspector: Review plans and specifications with the local building inspector, if not done so by the General Contractor.
7. OSHA Representative: Review plans and specifications with the local OSHA representative, if not done so by the General Contractor.
8. Dig Safe: This contractor shall notify and coordinate with Dig Safe prior to any excavation; digging; trenching; grading; tunneling; augering; boring; drilling; pile driving; plowing-in or pulling-in pipe, cable, wire, conduit, or other sub-structure; backfilling; demolition; and blasting related to this Contractor.

B. The Electrical Contractor shall pay for all permits, inspections, labor, material and fees associated with the various Utility Companies coordination requirements mentioned in this section and for this Contractor's work under this project.
C. The Electrical Contractor shall carry a minimum of $15,000 of utility expenses. In the case the expenses are less than the carried expense, the difference will be credited to the owner. In the case the utility charges are more than the carried expense, the remaining payment shall be coordinated between the Electrical Contractor, General Contractor and Owner.
D. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structural and other trades and to meet Architectural requirements.
E. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the electrical work shall interfere with the work of other trades, assist in working out the space conditions to make satisfactory adjustments before

installation. Without extra cost to the Owners, make reasonable modifications to the work as required by normal structural interferences. Pay the General Contractor for additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.

F. If any electrical work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the trades involved without extra cost to the Owners.
G. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect and Engineer for review and approval.

PART 2 – PRODUCTS

2.1 CONDUIT

A. Minimum Size: ¾-inch, unless otherwise specified.
B. Underground Installations:
   1. More than Five Feet from Foundation Wall: Use thick wall nonmetallic conduit concrete encased.
   2. Within Five Feet from Foundation Wall: Use rigid steel conduit concrete encased.
   3. In or Under Slab on Grade: Use plastic coated conduit.
   4. Minimum Size: 1-inch.
C. Outdoor Locations, Above Grade: Use rigid steel conduit.
D. In Slab Above Grade:
   1. Use rigid steel conduit.
   2. Maximum Size Conduit in Slab: ¾ inch (19 mm); ½ inch (13 mm) for conduits crossing each other.
E. Wet and Damp Locations: Use rigid aluminum conduit.
F. Dry Locations:
   1. Concealed and in Cable-Tray: Use metal clad (MC) cable (see Division 1)
   2. Exposed: (Unfinished or utility spaces) Use electrical metallic tubing.
G. Metal conduit: Rigid Steel Conduit shall comply with ANSI C80.1 and be heavy wall zinc coated steel. Rigid Aluminum Conduit shall comply with ANSI C80.5. Intermediate Metal Conduit (IMC) shall be rigid steel. Fittings and Conduit Bodies shall comply with ANSI/NEMA FB 1 and material to match conduit. Acceptable manufacturers are Western Tube and Conduit Company, Allied Tube and Conduit Company and Triangle Wire and Cable, Inc.
H. Flexible metal conduit shall be interlocked aluminum contruction. Fittings shall comply with ANSI/NEMA FB 1. Acceptable manufacturers are AFC Cable Systems, Electri-Flex Company and Eastern Flexible Conduit Technologies. All flexible conduits shall include a grounding conductor.
I. Electrical metallic tubing (EMT) shall comply with ANSI C80.3; galvanized zinc coated steel tubing. Fittings and Conduit Bodies shall comply with ANSI/NEMA FB 1; steel, compression or set screw type. Acceptable manufacturers are Western Tube and Conduit Company, Allied Tube and Conduit Company and Triangle Wire and Cable, Inc.
J. Nonmetal conduit shall comply with NEMA TC 2; Schedule 40 PVC, or as indicated on plans. Fittings and Conduit Bodies shall comply with NEMA TC 3. Acceptable manufacturers are Carlon or approved equal.
K. Flexible nonmetallic conduit (Sealtite) shall be UL and CSA listed for purpose specified and shown. Acceptable manufacturers are Carlon or approved equal.

L. Install conduit in accordance with NECA "Standard of Installation." Install nonmetallic conduit in accordance with manufacturer's instructions.
M. Arrange supports to prevent misalignment during wiring installation. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits. Fasten conduit supports to building structure and surfaces under provisions of Division 1. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports. Do not attach conduit to ceiling support wires.
N. Arrange conduit to maintain headroom and present neat appearance. Route exposed conduit parallel and perpendicular to walls. Route conduit installed above accessible ceilings parallel and perpendicular to walls. Route conduit in and under slab from point-to-point. Do not cross conduits in slab.
O. Maintain adequate clearance between conduit and piping. Maintain 12-inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
P. Cut conduit square using saw or pipe cutter; de-burr cut ends. Bring conduit to shoulder of fittings; fasten securely. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
Q. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.
R. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints. All expansion and deflection fittings shall have a ground strap. Provide suitable pull string in each empty conduit except sleeves and nipples. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
S. Ground and bond conduit under provisions of NEC 250.

2.2 BUILDING WIRE & CABLE

A. Building Wire and Cable shall be copper with 600V insulation rated at 75°C minimum, Type XHHW insulation for feeders and branch circuits larger than #3 AWG; Type THHN/THWN insulation for feeders and branch circuits #4 AWG and smaller.
B. Conductors shall be of soft drawn 98% minimum conductivity properly refined copper, solid construction where No. 10 AWG and smaller, stranded construction where No. 8 AWG and larger.
C. Exterior of wires shall bear repetitive markings along their entire length indicating conductor size, insulation type and voltage rating.
D. Exterior of wires shall be color coded, so as to indicate a clear differentiation between each phase and between each phase and neutral. In all cases, grounded neutral wires and cables shall be identified by the colors “white” or “gray”. In sizes and insulation types where factory applied colors are not available, wires and cables shall be color coded by the application of colored plastic tapes in overlapping turns at all terminal points, and in all boxes in which splices are made. Colored tape shall be applied for a distance of 6 inches along the wires and cables, or along their entire extensions beyond raceway ends, whichever is less.
E. Final connections to motors shall be made with 18” of neoprene sheathed flexible conduit.

F. Minimum branch circuit conductor size shall be No. 12 AWG installed in conduit. Motor control circuit wiring shall be minimum No. 14 AWG installed in conduit.
G. Fire alarm and security system wiring shall be No. 16 twisted non-shielded pairs for alarm and trouble circuits and a minimum of #14 AWG for device power, control and alarm annunciation circuits. Fire alarm system riser circuits shall be 2-hour rated, CI type (circuit integrity) cable per NFPA 72 and NEC 760.
H. Other wires and cables required for the various systems described elsewhere in this section of the Specifications shall be as specified herein, as shown on the Contract Drawings, or as recommended by the manufacturer of the specific equipment for which they are used, all installed in conduit.
I. Metal clad sheathed cable NFPA 70, type MC may be used for branch circuitry where shown and where run concealed and not subject to physical damage. All branch circuits shall be run in conduit from the panelboard to the first outlet. All type MC cable used shall contain a full size insulated ground conductor. All conductors shall be copper. All type MC cable insulation used shall have voltage rating of 600 volts, shall have a temperature rating of 75° C, and shall be thermoplastic material. Armor material shall be steel and armor design shall be interlocked metal tape. Fire alarm rated MC cable may be used for fire alarm work where concealed and approved by the Authority Having Jurisdiction.
J. Metal-Clad cable (Type MC) for circuits supplying computer equipment, electronic discharge lighting and other sensitive electronic equipment shall consist of 90°C THHN copper conductors with insulated ground and oversized neutral conductor (or one full size neutral conductor for each phase conductor). Cable shall be U.L. listed/labeled, and shall meet the requirements of NEC Art. 334 and 675.
K. Use armored cable (AFC Type HCF-90 or equal) for branch circuits and feeders in areas of patient care in hospitals, nursing homes and medical centers, medical office buildings and nurses' office areas of schools. This cable shall consist of 90°C THHN copper conductors with combined armor/bond wire (equipment) plus a green insulated ground (redundant). Use insulated bushings. Cable shall be U.L. listed/labeled, and shall meet the requirements of NEC Art. 333, 517 and 645.
L. Use armored cable (AFC Type HCF-90 or equal) for branch circuits and feeders in all buildings in the following areas; data processing systems, places of assembly, under raised floors, above suspended ceilings and in other environmental air-handling spaces. This cable shall consist of 90°C THHN copper conductors with combined armor/bond wire (equipment) plus a green insulated ground (redundant). Use insulated bushings. Cable shall be U.L. listed/labeled, and shall meet the requirements of NEC Art. 333, 517 and 645.
M. Mineral-insulated metal-sheathed fire-resistive cables, type MI, shall consist of a factory assembly of one or more solid copper conductors insulated with highly-compressed magnesium oxide and enclosed in a seamless, liquid and gas-tight continuous copper sheath. Cables shall be rated for 600 volts. Cable shall comply with Article 330 of the National Electrical Code. Cables shall be classified by Underwriters Laboratories, Inc. as having a 2-hour fire resistive rating. Cable terminations shall be made with UL listed mineral-insulated cable fittings. Installation of MI cables shall be in accordance with the manufacturer's instructions. Cables shall be as manufactured by Pyrotenax USA, Inc., or approved equal.
N. Wiring materials except MI cable shall be manufactured by Triangle, Essex, General Cable, AFC, Southwire or equal.
O. Concealed Dry Interior Locations: Use only building wire Type THHN/THWN or XHHW insulation in raceway, or metal clad cable where concealed and code acceptable.
P. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.

Q. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway or metal clad cable where code acceptable.
R. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
S. Exterior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
T. Underground Installations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
U. Wiring methods, in general, are as follows:
    1. Galvanized rigid steel conduit shall be used for telephone system sleeves for main cable runs between floors, closets, etc. and for sweeps, bends, etc. in ductbanks and as specifically noted on the plans. EMT shall be used generally for exposed circuiting in unfinished spaces. Metal clad cable (type MC) may be used for branch circuiting and fire alarm rated MC cable for fire alarm circuiting where run concealed and where code acceptable.
    2. To prevent transmittal of vibration to conduit, connections to any vibration producing equipment (i.e. transformers, motors, etc.) shall be terminated by 18 inches of flexible metal conduit. Where flexible connections are exposed to grease and oil, liquid-tight flexible metal conduit shall be used.
    3. In general, no splices or joints shall be permitted in either feeders or branches except at outlets or accessible junction boxes. Splices in wire #8 AWG and smaller shall be pigtail type, made mechanically tight. All conduit systems shall be complete.
    4. Raceway, boxes, etc., run on walls in wet areas which are subject to being washed down, shall be mounted on the walls with 1/4" stand-offs. All boxes shall be cast type.
V. Route wire and cable as required to meet the Project Conditions. Install cable in accordance with the NECA "Standard of Installation." Use solid conductor for feeders and branch circuits 10 AWG and smaller. Use stranded conductors for control circuits. Use conductor not smaller than 12 AWG for power and lighting circuits. Use conductor not smaller than 16 AWG for control circuits. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m). Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (160 m). Pull all conductors into raceway at same time. Use suitable wire pulling lubricant for building wire 4 AWG and larger. Protect exposed cable from damage.
W. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system, cables that are not part of the ceiling system cannot be supported from ceiling supports. Do not rest cable on ceiling panels. Use suitable cable fittings and connectors. Neatly train and lace wiring inside boxes, equipment, and panelboards.
X. Clean conductor surfaces before installing lugs and connectors. Make splices, taps, and terminations to carry full ampacities of conductors with no perceptible temperature rise. Use suitable reducing connectors or mechanical connector adapters for connecting aluminum conductors to copper conductors. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape un-insulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.

2.3 BOXES

A. Outlet Boxes:
    1. Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations shall be of cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps are not allowed in new construction.
    2. Each box shall have sufficient volume to accommodate number of conductors in accordance with requirements of NFPA 70. Boxes shall not be less than 1-1/2" deep unless shallower boxes are required by structural conditions and are specifically approved by Architect. Ceiling and bracket outlet boxes shall not be less than 4" octagonal except that smaller boxes may be used where required by particular fixture to be installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by fixture terminal temperature requirements. Switch and receptacle boxes shall be 4" square or of comparable volume. Luminaire and equipment supporting boxes shall be rated for weight of equipment supported; include 1/2 inch (13 mm) male fixture studs where required.
    3. Provide metallic boxes rated for 2-hour, fire-rated walls with gasket to reduce noise-transmission in all fire-rated walls. A minimum horizontal distance of 24-inches shall separate metallic boxes located on opposite sides of fire walls. This minimum horizontal spacing may be reduced using UL classified wall opening protective materials, commonly known as "putty pads" or "insert pads" pending written approval from the local authority having jurisdiction (AHJ). Refer to Architect's plans for all wall types prior to bid and any related work that will require 2-hour fire ratings.
    4. All boxes installed in demising walls separating tenants, electrical room walls, mechanical room walls, conference room walls, nurse's office walls, and other room walls deemed private by the Owner shall be provided with gasket to reduce noise-transmission.
    5. All boxes installed in exterior walls shall be provided with appropriate caulking and gaskets to seal off and prevent air leakage. Follow caulking and gasket manufacturer's installation guidelines to ensure correct and effective installation.
    6. Acceptable Manufacturers:
        a. Appleton
        b. Crouse Hinds
        c. Steel City
        d. RACO
B. Pull and Junction Boxes: Where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, furnish and install appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code. Where intermediate cable supports are necessary because of box dimensions, provide insulated removable core brackets to support conductors. Junction boxes are to be equipped with barriers to separate circuits. Where splices are to be made, boxes shall be large enough to provide ample work space. All conductors in boxes are to be clearly tagged to indicate characteristics. Boxes shall be supported independently of raceways. Junction boxes in moist or wet areas shall be galvanized type. Boxes larger than 4-inches square shall have hinged covers. Boxes larger than 12-inches in one dimension will be allowed to have screw fastened covers, if a hinged cover would not be capable of being opened a full 90 degrees due to installation location.
C. Fiberglass Handholes shall be die molded glass fiber. Cable Entrance shall be pre-cut 6-inch x 6-inch (150 mm x 150 mm) cable entrance at center bottom of each side. Cover shall be glass fiber weatherproof cover with nonskid finish.

D. Install boxes in accordance with NECA "Standard of Installation." Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
E. Set wall mounted boxes at elevations to accommodate mounting heights indicated or specified in section for outlet device. Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 10-feet (3m) if required to accommodate intended purpose. Orient boxes to accommodate wiring devices. Maintain headroom and present neat mechanical appearance.
F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 7.
G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
H. Use flush mounting outlet box in finished areas. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening. Do not install flush mounting box back-to-back in walls; provide minimum 6-inches (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use stamped steel bridges to fasten flush mounting outlet box between studs. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
I. Use adjustable steel channel fasteners for hung ceiling outlet box. Do not fasten boxes to ceiling support wires. Support boxes independently of conduit. Use gang box where more than one device is mounted together. Do not use sectional box. Use gang box with plaster ring for single device outlets. Use cast outlet box in exterior locations exposed to the weather and wet locations. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations. Set floor boxes level.
J. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
K. Adjust floor box flush with finish flooring material. Adjust flush-mounting outlets to make front flush with finished wall material. Install knockout closures in unused box openings.

2.4 WIRING DEVICES

A. Provide wiring device type plates for all wall-mounted devices. All wall plates shall be either brushed aluminum or smooth high impact nylon for all public areas as directed by the Architect. Provide galvanized steel for all Utility, Electric and Mechanical Rooms. Colors of wall plates as directed by the Architect.
B. Wiring devices standard for the project (i.e., with no specific type indicated) shall conform to the following:
    1. Visible part colors of wiring devices shall be as directed by the Architect for all public areas. Provide Ivory colored devices for all Utility, Electrical and Mechanical rooms.
    2. Exclude compact type devices.
C. Wiring device switches shall be toggle type, A.C. quiet design, specification grade, 20 amps on 120 volt circuits. Switches shall be mounted 48-inches to center line above finished floor unless noted otherwise. Equivalent 277volt, 20 amp switches shall be used where required.

D. Standard duplex convenience receptacles shall be 125volt, 20 amps, three wire (two circuit wires plus ground), “U-slot” ground NEMA configuration 5-20R, specification grade. Receptacles shall be mounted 18” to center line above finished floor unless noted otherwise. Where indicated on plans provide receptacles with ground fault current interrupters, UL Class A; 20A, 125V.
E. Non-standard convenience receptacles and special purpose power supply receptacles shall be as listed on plans.
F. Provide ground fault circuit interrupter (GFCI), weather-resistant type receptacles in all wet and damp locations as defined by the National Electrical Code. All outdoor receptacles and where indicated on the plans shall be installed in a weatherproof while-in-use enclosures.
G. Weatherproof Receptacle Enclosures shall be NEMA 3R rated for rain-tight while-in-use, gasketed, impact resistant thermoplastic with hinged gasketed device cover.
H. Provide extension rings to bring outlet boxes flush with finished surface. Clean debris from outlet boxes. Install devices plumb and level. Install receptacles with grounding pole on top. Connect wiring device grounding terminal to branch circuit equipment grounding conductor. Use jumbo size plates for outlets installed in masonry walls. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
I. Install wall switch 48 inches above finished floor to top of handle. On position, shall be up. Install convenience receptacles 18-inches above finished floor. Install convenience receptacle 6-inches above backsplash of counter. Install dimmer switches 48 inches above finished floor to top.
J. Verify that each receptacle device is energized. Test each receptacle device for proper polarity. Test each GFCI receptacle device for proper operation.

2.5 CABINETS & ENCLOSURES

A. Cabinets shall be as follows: Boxes: Galvanized steel. Box Size: As required and/or indicated on plans. Backboard: Provide 3/4-inch thick plywood backboard for mounting terminal blocks. Paint matte white. Fronts: Steel, flush type with concealed trim clamps, door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel. Knockouts: As required and/or indicated on plans. Provide metal barriers to form separate compartments wiring of different systems and voltages. Provide accessory feet for free-standing equipment.
B. Hinged Cover Enclosures shall be as follows: Construction: NEMA 250, Type 1, 3R, or 4 steel enclosure, as required and/or indicated on plans. Covers: Continuous hinge, held closed by flush latch operable by key or hasp and staple for padlock. Provide interior plywood panel for mounting terminal blocks and electrical components; finish with white enamel. Enclosure Finish: Manufacturer's standard enamel.
C. Install in accordance with NECA "Standard of Installation." Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions of Section 16190. Install cabinet fronts plumb.
D. Clean electrical parts to remove conductive and harmful materials. Remove dirt and debris from enclosure. Clean finishes and touch up damage.
E. ICS 4 - Terminal blocks for industrial control equipment and systems. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts. Provide ground bus terminal block, with each connector bonded to enclosure.

F. Provide grounding provisions for all cabinets/enclosures and bond to grounding system as required per Code.

2.6 GROUNDING & BONDING

A. Ground all systems and equipment in accordance with best industry practice, the requirements of NFPA 70 and the following:
   1. The ground bus of the main switchboard shall be connected to the main grounding electrode specified below by means of insulated conductors run in conduit.
   2. The main grounding electrode shall be an accessible point on the nearest metallic main water service pipe. Connection shall be made on the street side of the main valve utilizing a ground clamp of a type specifically manufactured for the purpose. Bonding jumpers shall be provided around the water meters and around insulating joints and/or sections.
   3. Establish a ground bonding connection from the effectively grounded structural building steel to each cold-water main entering the building. Each bonding connection shall consist of insulated conductors run in conduit.
   4. The water pipe ground shall be supplemented by an additional electrode consisting of three (3) buried 3/4" diameter by 10’-0” long copperweld ground rods spaced 10’-0” apart, and provided in sufficient quantity so as to have measured resistance to ground of not more than 10 ohms. Provide independent certification confirming this. Establish a bonding connection from the electrode consisting of green insulated conductors run in conduit and sized as indicated hereinafter for main and supply side of service bonding jumpers.
   5. Provide grounding bonds between all metallic conduits of the light and power system which enter and leave cable chambers or other non-metallic cable pulling and splicing boxes. Accomplish this by equipping the conduits with bushings of the grounding type individually cross connected.
   6. Bond metallic conduits containing grounding electrode conductors and main bonding conductors to the ground bus service enclosure and/or grounding electrode at both ends of each run utilizing grounding bushings and jumpers.
   7. Provide grounding bonds for all metallic conduits of the light and power system which terminate in pits below equipment for which a ground bus is specified. Accomplish this by equipping the conduits with bushings of the grounding type connected individually to the ground bus.
   8. Provide supplementary ground bonding where metallic conduits terminate at metal clad equipment (or at the metal pull box of equipment) for which a ground bus is specified. Accomplish this be equipping the conduits with bushings of the grounding type connected individually by means of jumpers to the ground bus. Exclude the jumpers where directed. This exclusion will be required where an isolated ground for electronic equipment is to be maintained.
   9. Each grounding type bushing shall have the maximum ground wire accommodation available in standard manufacture for the particular conduit size. Connection to bushing shall be with wire of this maximum size.
   10. Bonding conductors on the load size of the service device and equipment grounding conductors shall be sized in relation to the fuses or trip size of the overcurrent device supplying the circuit.
   11. The central equipment for the fire protective alarm system and telephone system shall have its grounding terminal connected to the grounding electrode by means of a No. 6 green coded insulated conductor, run in 3/4" conduit. Utilize a ground clamp of a type specifically manufactured for the purpose.

12. Install rod electrodes per this section & in compliance with Code. Install additional rod electrodes as required to achieve specified resistance to ground. Install 4/0 AWG bare copper wire in foundation footing as required. Provide isolated grounding conductor for circuits supplying personal computers as indicated on the plans. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Provide a 3/4" raceway with #6 AWG ground wire from main telephone terminal board to the service ground.
13. Perform inspections and tests listed in NETA ATS, Section 7.13. Document test results in Record Documents.
14. Swimming Pools, fountains & similar installations: Refer to NEC 680 for requirements for grounding and bonding. Provide all grounding and bonding per NEC 680 and 250.
15. Grounding means shall never exceed 10 ohms when located outdoors, or 5 ohms when located indoors.
16. An acceptable means of grounding is to provide an underground 2" thick, concrete-encased electrode of either ½" diameter, electrically conductive reinforcing bar of #4/0 bare copper conductor (minimum of 20-feet in length) per NEC 250.52(A)(3).

2.7 EQUIPMENT WIRING SYSTEMS

A. Cords & Caps: Manufacturers: Hubbel, Pass & Seymour or Arrow Hart. Attachment Plug Construction: Conform to NEMA WD 1. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment. Cord Construction: ANSI/NFPA 70, Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
B. Motor Control Equipment: Each motor shall have a starter furnished under this Section where it is not being supplied by other sections. Wire and installed under this Section, unless otherwise noted herein or on the drawings.
   1. Connect the motor starting devices for all motors, except where otherwise specifically provided for under other sections, furnish all necessary connections between controllers and motors, in conduit and leave motors ready to start. Change connections, if necessary, to secure proper rotation of motors.
   2. Perform all the necessary wiring in connection with the motor starting and remote control equipment, where so designated, furnished under other sections. Where control or starting equipment is sent to the job as individual units, they shall be installed, wired up complete and left ready for operation under work of this section.
   3. Wiring to motor shall be in rigid conduit with watertight flexible conduit from wall to motor only.
C. Included in the general requirements for motor control equipment wiring and connections, the following specified items shall be performed:
   1. Installation and connection of motor controls which will be furnished under the heating, ventilating and air conditioning section and the plumbing section.
D. Starters by This Contractor: Where starters are not provided under other sections, this Contractor shall furnish starters for motors 1/2 HP and larger and where required by the control sequence for smaller motors and shall be magnetic across the line starters with adjustable overload protection in each phase line, all in NEMA 1 enclosures. Starters shall be solid state or acceptable substitute. Combination starters shall be with fused or non-fusible disconnect as required.
   1. Magnetic starters shall have 120 volt holding circuits, integral transformers, auxiliary contacts as required by the control sequence and integral selector switches with push-

to-test pilot lights. One side of each pilot light shall be connected on the load side of the motor starter.
2. Integral transformers shall have overload protection on the secondary section and, also, the secondary neutral shall be grounded.
3. Starters shall be as manufactured by Square D Company or General Electric.

E. Temperature control wiring shall be by others as indicated under the heating, ventilating and air conditioning section.
F. Provide a suitable plywood backboard on a wall and/or angle iron or unistrut framework with plywood for all starters. Starters will be installed and wired under this section.
G. All starters shall be located next to the panel feeding same, if panel is in a closet or utility space, unless noted otherwise on the drawings. If panel is located in a finished space (i.e. corridor, gymnasium, etc.) starters shall be located in nearby utility closet or space acceptable to the Engineer.
H. Nameplates: Each starter shall have a 1.0" x 2.5" hot stamped nameplate identifying the unit and panel it is fed from. The lettering shall be white 1/2" high in a black background.
I. Connections to systems: Make electrical connections in accordance with equipment manufacturer's instructions. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes. Install disconnect switches, controllers, control stations, and control devices as indicated. Modify equipment control wiring with terminal block jumpers as indicated. Provide interconnecting conduit and wiring between devices and equipment where indicated.
J. Building and Energy Management Systems (BMS/EMS): This contractor shall provide a price to the Mechanical Contractor to provide power and data wiring to all BMS/EMS components requiring same. Coordinate with Mechanical Contractor prior to bid and prior to any work the exact wiring requirements, connections requirements and exact locations for all BMS/EMS components. Such components shall include, but may not be limited to:
1. Control transformers
2. Central equipment controllers
3. BMS controllers
4. BMS Head-end equipment
5. Line-voltage thermostats

2.8 SUPPORTING DEVICES

A. Materials and Finishes: Provide adequate corrosion resistance. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products. Steel channel shall be galvanized.
B. Anchors and Fasteners:
1. Concrete Structural Elements: Use precast insert system, expansion anchors.
2. Steel Structural Elements: Use beam clamps, or welded fasteners.
3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
5. Solid Masonry Walls: Use expansion anchors or preset inserts.

6. Sheet Metal: Use sheet metal screws.
7. Wood Elements: Use wood screws.

C. Installation: Install products in accordance with manufacturer's instructions. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation". Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Do not use spring steel clips and clamps. Do not use powder-actuated anchors. Do no drill or cut structural members. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts. Install surface-mounted cabinets and panelboards with minimum of four anchors. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

2.9 ELECTRICAL IDENTIFICATION

A. Nameplates: Engraved three-layer laminated plastic, black letters on white background. Locations: Each electrical distribution and control equipment enclosure, communication cabinets. Letter Size: Use 1/8 inch letters for identifying individual equipment and loads. Use 1/4 inch letters for identifying grouped equipment and loads.
B. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use for identification of individual power receptacle faceplates indicating panel & circuit number the outlet is fed from and control device stations. In addition to nameplates as described above, use labels on all panelboards, disconnect switches and enclosed circuit breakers to identify where the equipment is fed from, voltage & phase.
C. Wire markers: Tape, or tubing type wire markers. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection. Power and Lighting Circuits shall be marked with panel and branch circuit or feeder number as indicated on drawings. Control Circuits shall be marked with control wire number indicated on schematic and interconnection diagrams on drawings
D. Conduit markers: Corrosion and abrasion resistant. Location: Furnish markers for each conduit longer than 6 feet (2 m). Spacing: 20 foot on center. Indicate voltage and phase.
E. All panelboards shall be provided with a typed (hand written is not allowed) circuit directory indicating the load fed by each circuit breaker and it’s location in the building.

2.10 ENCLOSED SWITCHES

A. Fusible Switch Assemblies shall be provided in accordance with the following. Description: NEMA KS 1, Type GD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses. Provide NEMA 3R where located outdoors, kitchens or other interior wet areas.
B. Non-fusible switch assemblies shall be provided in accordance with following. Description: NEMA KS 1, Type GD with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position. Provide NEMA 3R where located outdoors, kitchens or other interior wet areas.
C. Install in accordance with NECA "Standard of Installation”. Install fuses in fusible disconnect switches. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

2.11 PANELBOARDS

A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
B. Panelboard Bussing: Bus bars shall be copper. Provide copper ground bus bar in all panelboards.
C. Minimum Integrated Short Circuit Rating: 10,000 amperes RMS symmetrical for 240 volt panelboards; 65,000 amperes RMS symmetrical for 480 volt panelboards, or as indicated.
D. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.
E. Enclosure: NEMA PB 1, Type 1.
F. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.
G. Cabinet Front: Flush or Surface cabinet front as scheduled with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard ANSI 49 enamel.

2.12 ENCLOSED CIRCUIT BREAKERS

A. Enclosed Molded Case Circuit Breaker: Comply with NEMA AB 1. Include provisions for padlocking. Provide insulated grounding lug in each enclosure. Provide Products suitable for use as service entrance equipment where so applied. Fabricate enclosure from steel.
B. Install enclosed circuit breakers where indicated, in accordance with manufacturer's instructions. Install enclosed circuit breakers plumb. Provide supports in accordance with these specifications. Height: 5 ft (1.6 M) to operating handle. Provide engraved plastic nameplates.
C. Inspect each circuit breaker visually. Perform several mechanical ON-OFF operations on each circuit breaker. Verify circuit continuity on each pole in closed position. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements. Include description of testing and results in test report.

2.13 FUSES

A. All fuses shall be rated for proper voltage in which they are applied. Interrupting ratings shall be greater than the short circuit current available at the terminals of the switch.
B. Fuse types:
   1. Fuses for branch circuits shall be time delay class J.
   2. Fuses for equipment other than motor loads shall be general fast acting RK-5 or Class J.
   3. Control power transformers for motor controller circuits shall be as recommended by motor starter and motor control center manufacturer.
   4. Fuses for motors shall be sized at 250% of the motor FLA.
   5. Fuses for non-motor loads shall be sized at 125% of the rated FLA of equipment served.
   6. Fuses for elevator lifts shall be dual element type and sized in accordance with the elevator manufacturer’s recommendations.
C. Spare Fuses
   1. Provide spare fuses in the amount of 20% (not less than three (3) nor more than nine (9) of all sizes and types).

2. Spare fuses shall include general purpose fuses, motor fuses, and control fuses used in motor control centers, starters etc.
3. A complete list and quantity of spare fuses shall be submitted with record drawings for review.

2.14 ENCLOSED MOTOR CONTROLLERS

A. The Electrical Contractor shall review the mechanical drawings and coordinate with the Mechanical Contractor for electrical components of the mechanical equipment and systems such as motors, factory mounted motor starters, factory mounted disconnect switches, variable frequency drives and controls to be provided under Division 15 (by the Mechanical Contractor).
B. The Electrical Contractor shall provide motor starters, variable frequency drives and disconnect switches for equipment shown on the drawings where the Mechanical Contractor is not providing such equipment.
C. The electrical contractor shall provide all power wiring for all HVAC equipment.
D. Manual Motor Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller with thermal overload elements on each phase, red pilot light, NO, NC auxiliary contact, and push button or toggle operator.
E. Fractional Horsepower Manual Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload elements on each phase, red pilot light, and toggle operator.
F. Motor Starting Switch: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload elements on each phase, with red pilot light and toggle operator.
G. Enclosures: NEMA ICS 6; Type 1 for indoors and Type 3R for outdoors and wet/damp locations (kitchens, mechanical rooms, pool equipment rooms, etc...).
H. Automatic Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower. Reversing Controllers: Include electrical interlock and integral time delay transition between FORWARD and REVERSE rotation. Two Speed Controllers: Include integral time delay transition between FAST and SLOW speeds. Coil operating voltage: 120volts, 60 Hertz. Overload Relay: NEMA ICS; bimetal or melting alloy. Enclosure: NEMA ICS 6, Type 1 for indoors or Type 3R for outdoors and wet/damp locations (kitchens, mechanical rooms, pool equipment rooms, etc...).
I. Product Options and Features as follows. Auxiliary Contacts: NEMA ICS 2, 2 each normally open and closed contacts in addition to seal-in contact. Cover Mounted Pilot Devices: NEMA ICS 2, standard duty type. Pilot Device Contacts: NEMA ICS 2, Form Z, rated A150. Pushbuttons: Recessed type. Indicating Lights: LED type. Selector Switches: Rotary type. Relays: NEMA ICS 2. Control Power Transformers: 120 volt secondary, in each motor starter. Provide fused primary and secondary, and bond un-fused leg of secondary to enclosure.
J. Installation Requirements: Install enclosed controllers where indicated, in accordance with manufacturer's instructions. Install enclosed controllers plumb. Provide supports in accordance with these specifications. Height: 5 feet to operating handle. Install fuses in fusible switches. Select and install overload heater elements in motor controllers to match installed motor characteristics. Provide engraved plastic nameplates under these specifications. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

2.15 SWITCHBOARD

A. Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified. The dimensions shown in the detail are based on Siemens. The electrical contractor (E.C.) shall be responsible for verifying physical sizes of any substituted equipment and ensure the equipment will fit in the space shown with all required clearances prior to submitting substituted equipment shop drawings. Bracing and protective devices shall be such as to withstand and interrupt short circuit stresses of 65,000 amps symmetrical or available short circuit whichever is larger. The main switchboard shall be listed with an Underwriters label attesting to its suitability as service entrance equipment. Acceptable manufacturers are Cutler-Hammer, Square D, Siemens or General Electric. Provide manufacturers integral transient voltage surge suppression (TVSS) on main.
B. Ratings:
    1. Voltage: 208Y/120 volts as required.
    2. Configuration: Three-phase, four wire, grounded.
    3. Main Bus: 400 amperes.
    4. Integrated Equipment Rating: As noted on the plans.
C. Main Section Devices: Individually mounted.
D. Distribution Section Devices: Group mounted.
E. Auxiliary Section Devices: Individually mounted.
F. Bus Material: Copper with tin plating, standard size.
G. Bus Connections: Bolted, accessible from front for maintenance.
H. Ground Bus: Extend length of the switchboard.
I. Molded Case Circuit Breakers: (distribution) molded case breakers with inverse time and instantaneous tripping characteristics. Provide circuit breakers UL listed as Type HACR for air-conditioning equipment branch circuits. Circuit breakers shall have thermal-magnetic trip units and inverse time-current characteristics.
J. Molded Case Circuit Breakers: (main breaker) 2000ampere / 3-pole inverse time, instantaneous tripping characteristics and ground fault protection shall be provided.
K. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and sizes indicated.
L. Pull /Tap Section: Size as required. Depth and height to match switchboard.
M. Future Provisions: Fully equip spaces for future devices with bussing and bus strap connections for maximum CB listed, suitably insulated and braced for short circuit currents. Provide continuous current rating as indicated.
N. Pull Box: If required, shall have removable top and sides, same construction as switchboard, size as shown on Drawings. Provide insulating, fire-resistive bottom with separate openings for each circuit to pass into switchboard.
O. E.C. shall coordinate with general and mechanical contractors prior to installation of the switchboard or any mechanical systems to verify and ensure all systems, piping, ductwork, etc... foreign to switchboard will comply with NEC article 110 for "working space" and "dedicated electrical space".
P. The switchboard shall be provided with an engraved nameplate on the front indicating the designation, voltage, rating of main circuit breaker or main lugs and source of supply. In addition, all branch circuit breakers shall be provided with engraved nameplates indicating the designation of the load being fed (i.e. "Panel LB-1").

Q. Enclosure: Type 1 - General Purpose.
   1. Align sections at front and rear.
   2. Switchboard Height: 90 inches, excluding floor sills, lifting members and pull boxes.
   3. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

R. Provide a micro-processor based monitoring device that provides simultaneous current, voltage, and frequency metering. 1% accuracy for AC amperes and AC voltage and 0.5% accuracy for frequency.

S. Current Transformers: ANSI C57.13, 5 ampere secondary, wound or window type, with single secondary winding and secondary shorting device, primary/secondary ratio as required, burden and accuracy consistent with connected metering and relay devices, 60 hertz.

T. Potential Transformers: ANSI C57.13, 120 volt single secondary, disconnecting type with integral fuse mountings, primary/secondary ratio as required, burden and accuracy consistent with connected metering and relay devices, 60 Hertz.

U. Tighten accessible bus connections and mechanical fasteners after placing switchboard. Adjust all operating mechanisms for free mechanical movement. Tighten bolted bus connections in accordance with manufacturer's instructions. Adjust circuit breaker trip and time delay settings to values as required by manufacturer.

2.16 ENCLOSED CONTACTORS

A. General purpose contactors: NEMA ICS 2, AC general purpose magnetic contactor. Coil Voltage as indicated. Poles as indicated. Size as indicated. Enclosure per ANSI/NEMA ICS 6, Type as scheduled.

B. Lighting contactors: NEMA ICS 2, magnetic lighting contactor. Coil Voltage as indicated. Poles as indicated. Size as indicated. Contact Rating shall match branch circuit overcurrent protection, considering de-rating for continuous loads.

C. Accessories: Provide Pushbuttons and Selector Switches per NEMA ICS 2, heavy duty type. Provide indicating lights per NEMA ICS 2, push-to-test type. Provide auxiliary contacts per NEMA ICS 2, Class A300 or A600 as required per equipment served.

2.17 INTERIOR LUMINAIRES

A. Lighting fixtures shall be in accordance with identifications as follows:

B. All lamping shall be of the highest quality available.

C. Finishes shall be as selected by the Architect or as indicated on the plans.

D. Any additional appurtenances required for installation and operation, where same are not covered by the identification used on the drawings, shall be included. Lighting fixtures and equipment shall be furnished complete, wired and assembled, including canopies, lamps and other incidental items. Install specified lamps in each luminaire.

E. Recessed fixtures shall be coordinated with ceiling construction by the Electrical Contractor prior to Bid. Refer to the Architect’s plans, details and elevations for ceiling types by area. Provide plaster trim kits as required by ceiling construction.

F. Exact location of all fixtures shall be confirmed with Architect prior to rough-in. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

G. Recessed fixtures throughout shall have their components, wiring and external connections coordinated for use in ceilings utilized as air handling plenums. Install recessed luminaires to permit removal from below. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. Install clips to secure recessed grid-supported luminaires in place
H. Fixtures for use outdoors or in areas designated as damp locations, shall be suitably gasketed and UL listed for such applications.
I. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire
J. Emergency batteries for exterior fixtures shall be remote mounted within the building. Verify maximum distances for remote mounting the emergency batteries with the manufacturer prior to installation. Locate remote emergency batteries above accessible ceilings or utility rooms as required. Provide test switches for all emergency batteries as required.
K. Unless noted otherwise, all fixtures shall be 3500K and have a minimum CRI of 85.
L. The Contractor shall obtain all information relative to the exact type of hung ceilings and suspension systems to be installed before ordering any recessed fixtures. This Contractor shall furnish the proper type fixtures applicable to the ceiling framing system. If, other than the type of fixtures specified are required for installation due to the type of ceiling construction, this Contractor shall furnish and install the proper type fixtures and mounting appurtenances required at no extra charge.
M. The Contractor shall coordinate the exact locations of all lighting fixtures with the ceiling pattern during the construction period and before installation of the fixtures. Interferences between lighting fixtures, and other equipment, shall be brought to the attention of the General Contractor.
N. Include the aiming and/or adjustments of all lighting fixtures requiring same in accordance with instructions issued by the Architect in the field. Aim and adjust luminaries as indicated or as directed by the Owner, Architect or Engineer. Position exit sign directional arrows as indicated. Operate each luminaire after installation and connection. Ensure proper connection and operation.
O. Lighting fixtures shall be supported from building structure only, not from hung or suspended ceiling, by means of chains or threaded rods. The use of tie wire will not be allowed. All fixtures shall include seismic clips and shall be supported to comply with seismic regulations. Install suspended luminaires using pendants supported from swivel hangers or other suitable leveling means. All rows of fixtures shall be level, aligned with building lines and run parallel to each other. Provide pendant length required to suspend luminaires at indicated height. Support luminaires to building structure, independent of ceiling framing.

2.18 FIRE ALARM SYSTEM

A. GENERAL
1. The contractor shall submit complete documentation for the Fire Alarm/Life Safety System Data Sheets for all items to ensure compliance with these specifications. Copies of this information shall be submitted as required to the Architect award of this work and shall be subject to the approval of the architect.
2. The contractor shall submit, as part of the complete bid documentation package, certification that the engineered system distributor is a fully authorized factory trained and certified distributor of the system detailed within this specification.
3. All equipment and material shall be new and unused, and listed by Underwriter's Laboratories for the specific intended purpose. All control panel components, field

peripherals and interactive computer peripherals shall be designed for continuous duty operation without degradation of function or performance.

4. All equipment covered by this specification or noted on installation drawings shall be the best equipment suited for the application and shall be provided by a single manufacturer.
5. Provide all equipment and accessories and compatible devices for a complete and fully functioning addressable fire alarm system. The fire alarm system shall be coordinated with and inspected by the local fire department, and any inconsistency mentioned during any inspection shall be corrected by contractor at no additional cost to owner.
6. The control panel shall contain a microprocessor with 10/100 ethernet media access controller (MAC). The system shall be designed specifically for fire detection, and notification applications.
7. The installing contractor shall coordinate master-box, radio-box, and/or dialer requirements with local fire department.

B. FIRE ALARM LIFE SAFETY SYSTEM SEQUENCE OF OPERATION

1. Public Mode: The operation of a manual station or activation of any automatic alarm initiating device (system smoke, heat, waterflow) in the common areas of the building, shall automatically:
   a. Initiate the transmission of the alarm to the Municipal Fire Station or approved Central Station via the Local Energy or Radio Master-box where required by Code.
   b. Sound a code 3 temporal evacuation signal over all audible circuits.
   c. Flash all visual signals throughout the building in a synchronized manner.
   d. Flash an alarm LED and sound an audible signal at the FACP. Upon acknowledgement, the alarm LED shall light steadily and the audible shall silence. Subsequent alarms shall re-initiate this sequence.
   e. Upon alarm initiation by an elevator lobby smoke detector or other designated recall device, recall all elevators that serve the floor of initialization to the main egress level. If the alarm initiates on the main egress level, return the elevator to the alternate floor as directed by the local authority having jurisdiction.
   f. Visually indicate the alarm initiating device type and location via the LCD display located at the FACP (and at any remote annunciators) and (illuminate the appropriate alarm zone LED at the remote annunciator).
   g. Automatically shut down or control HVAC equipment to initiate smoke control functions as required. Manual override controls and programmable relay interface shall serve as an interface to the Building Automation System.
   h. Operate prioritized outputs to release all magnetically held smoke doors and magnetically locked doors throughout the building.
   i. Activate the exterior weatherproof beacon.
2. Private mode: The activation of any automatic local alarm initiating device (sounder-base with smoke, or combination smoke/carbon monoxide device) within an apartment shall automatically:
   a. Sound a code 3 temporal evacuation signal for smoke to all alarm devices within the apartment and a code 4 temporal evacuation signal for carbon monoxide to all alarm devices within the apartment.
   b. Visually indicate a supervisory trouble condition of the type and location of the initiating device via the LCD display located at the FACP (and at any remote annunciators) and (illuminate the appropriate zone LED at the remote annunciator).

C. WIRING

1. Provide in accordance with manufacturer's instructions all wiring, conduit and outlet boxes required for the installation of complete system as described herein and as shown on the drawings. Wiring shall be Class A.

2. Installation and fire alarm system wiring shall be installed in metal raceway. An equipment bonding conductor shall be provided in all flexible metallic raceways.
3. Color code for fire alarm systems shall be per the State Fire Alarm code.
4. DC supply to the main fire alarm panel shall be white and black. Fire alarm primary power source shall be on dedicated branch circuit. Circuit breaker locks shall be used. If a separate feed is required for the battery charger it shall be black and white unless the main fire alarm panel required only AC feed. In this case the conductors to the battery charger shall be red and white and shall be on a circuit breaker of fits own.
5. Conductors shall be minimum #14-gauge solid copper type THHN/THWN. Conductor's size shall be increased as required to maintain voltage drop to a maximum of 3%. All AC and DC portions of the system shall be installed in separate raceway. Addressable loop wiring may be #16 providing manufacturer's recommended distance is observed. Systems requiring shielded wiring for addressable loops shall not be acceptable.
6. Red painted terminal cabinets with hinged local covers shall be provided at all junction points. All conductor splices shall be made on screw type terminal blocks, wire nuts shall not be used. All terminals within terminal cabinet shall be properly labeled. Provide terminal cabinet at each building cable entrance and at other locations as required.
7. All fire alarm initiating zone and signal wiring shall be wired Class A.
8. Final connections between the equipment and the wiring system shall be made under the direct supervision of a representative of the manufacturer.
9. Upon completion of the installation of fire alarm equipment, the electrical contractor shall provide to the engineer a signed statement substantially in the form as follows:
    a. The undersigned having been engaged as the electrical contractor on this project confirms the fire alarm equipment was installed in accordance with the specifications and in accordance with wiring diagrams, instructions, and directions provided to us by the manufacturer.

D. GUARANTEE AND FINAL TEST
1. All testing (pre-testing, final testing, quarterly testing and program change testing) to be coordinated with the owner and scheduled in advance so that owners and personnel can be present during testing. Contractor to certify that all tests comply with the "State Fire Code", latest edition.
2. Before this installation shall be considered complete and acceptable to the awarding authorities, a complete test on the system shall be performed as follows:
    a. A pre-test will be held by the electrical contractor with the manufacturer's authorized representative present. After certification of a complete pre-test, the installing contractor shall inform the authority having jurisdiction of the outcome of the test and will re-inspect in the presence of the authority having jurisdiction and the manufacturer's authorized representative.
    b. Final test: The electrical contractor in the presence of authorized representative of the manufacturer and the fire department shall operate every manual station, smoke detector, and thermodetector. Each station/detector circuit and horn circuit shall be opened in at least two locations to check for the presence of correct supervisory circuitry. When this testing ahs been completed to the satisfaction of both the electrical contractor's job foreman and the representative of the manufacturer, a letter from the contractor cosigned by the manufacturer attesting t the satisfactory completion of said testing, shall be forwarded to the owner.
3. The electrical contractor shall guarantee all equipment and wiring to be free from inherent mechanical and electrical defects for a period of one year from the date of final acceptance.

4. The contractor shall provide the Owner with a formal written equipment guarantee upon completion of the installation and testing of the system. The guarantee period shall begin on the day of acceptance of the system by the Owner and shall provide for a period of one year. This guarantee shall be indicated in the manufacturer's submission prior to approval. This guarantee shall be as normal policy by the equipment manufacturer.
5. The manufacturer shall maintain a full-time service and parts facility, with seven days per week, 24 hour per day service available.
6. All service technicians shall be licensed by the State Fire Code covering service and maintenance of systems.
7. Include as part of the contract, the four quarterly tests following the final acceptance test. Provide quarterly testing in conformance with the State Fire Code latest addition.

2.19 DATA

A. The Electrical Contractor shall provide and install the data outlets and wiring per the Owner's specifications and direction per data outlet and wiring as shown on the plans. Each data connection shall include the following:
   1. Data outlet installed flush in the wall unless otherwise required by the site conditions and approved by the Owner. The outlet shall include faceplate, ID label, inserts, jacks and all other required accessories for a complete installation.
   2. Wiring consisting of Category 6, 24AWG, copper cabling installed from outlet to patch panel. All wiring shall be installed concealed in finished & public spaces unless otherwise required by the site conditions and approved by the Owner. shall be used from the outlet to an accessible ceiling. In unfinished or utility spaces, the data cabling shall be installed in EMT conduit where not concealed. Accessible above ceiling installations shall use J-hooks unless cable tray is used. Use plenum rated cable where installed in plenum return spaces per the Mechanical Contractors direction prior to bid.
   3. Patch panel and outlet terminations. Provide identification labels at each end of the cable per the Owners requirements. Coordinate with Owner for nomenclature.
   4. Test each cable for signal strength per EIA/TIA standards and record all results to be submitted to the Owner. All defective cable and/or termination shall be replaced at no cost to the Owner.
B. Provide patch panel(s) to accommodate each outlet plus 10% spare. Provide rack(s) to accommodate each patch panel.
C. Provide a copper ground bar (1/4" thick x 4" high x 36" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each telephone / data closet, server room and/or IDF closet. Connect pig tail to building steel or electrical service grounding system.
D. Servers, switches, routers and active electronic equipment by Owner.

2.20 TELEPHONE

A. Provide incoming telephone service raceways and cable as indicated on Drawings or as required by the serving telephone company. Provide 8' x 8' x ¾" plywood board (and one double duplex outlet) on wall for telephone equipment. Provide 3/4-inch thick plywood board, fire-retardant-treated and stamped FRT, securely anchored to the wall.

B. The Electrical Contractor shall provide and install the telephone outlets and wiring per the Owner's specifications and direction as shown on the plans. Each telephone connection shall include the following:
   1. Telephone outlet installed flush in the wall unless otherwise required by the site conditions and approved by the Owner. The outlet shall include faceplate, ID label, inserts, jacks and all other required accessories for a complete installation.
   2. Wiring consisting of Category 6, 24AWG, copper cabling installed from outlet to patch panel. All wiring shall be installed concealed in finished & public spaces unless otherwise required by the site conditions and approved by the Owner. shall be used from the outlet to an accessible ceiling. In unfinished or utility spaces, the data cabling shall be installed in EMT conduit where not concealed. Accessible above ceiling installations shall use J-hooks unless cable tray is used. Use plenum rated cable where installed in plenum return spaces per the Mechanical Contractors direction prior to bid.
   3. Telephone terminal board or PBX (private branch exchange) equipment and outlet terminations. Provide identification labels at each end of the cable per the Owners requirements. Coordinate with Owner for nomenclature.
   4. Test each cable for signal strength per EIA/TIA standards and record all results to be submitted to the Owner. All defective cable and/or termination shall be replaced at no cost to the Owner.

C. Provide a copper ground bar (1/4" thick x 4" high x 36" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each telephone room and telephone terminal board. Connect pig tail to building steel or electrical service grounding system per the telephone company's requirements.

D. PBX (private branch exchange) equipment by Owner.

2.21 CABLE TELEVISION

A. Provide incoming cable television service raceways and cable as indicated on Drawings or as required by the serving cable television company. Provide 8' x 8' x ¾" plywood board (and one double duplex outlet) on wall for cable equipment. Provide 3/4-inch thick plywood board, fire-retardant-treated and stamped FRT, securely anchored to the wall. Provide flush mounted CATV outlets with 3/4-inch EMT conduit concealed from outlet box to cable terminal board. Leave a pull string in all empty conduits.

B. Provide a copper ground bar (1/4" thick x 4" high x 36" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each CATV terminal room and main CATV terminal board. Connect pig tail to building steel or electrical service grounding system per the CATV utility company's requirements.

C. The Electrical Contractor shall provide and install the CATV outlets and wiring per the Owner's specifications and direction as shown on the plans. The allowance for each CATV connection shall include the following:
   1. CATV outlet installed flush in the wall unless otherwise required by the site conditions and approved by the Owner. The outlet shall include faceplate, ID label, inserts, jacks and all other required accessories for a complete installation.
   2. Wiring consisting of coaxial copper cabling per the CATV utility company's requirements installed from outlet to terminal board. All wiring shall be installed concealed in finished & public spaces unless otherwise required by the site conditions and approved by the Owner. be used from the outlet to an accessible ceiling. In unfinished or utility spaces, the data cabling shall be installed in EMT conduit where not concealed. Accessible above ceiling installations shall use J-hooks unless cable tray is used. Use plenum rated cable

where installed in plenum return spaces per the Mechanical Contractors direction prior to bid. The length of cable to be used for the allowance shall be based on 100'-0".

3. CATV terminal board and outlet terminations. Provide identification labels at each end of the cable per the Owners requirements. Coordinate with Owner for nomenclature.
4. Test each cable for signal strength per CATV utility company's requirements and record all results to be submitted to the Owner. All defective cable and/or termination shall be replaced at no cost to the Owner.

2.22 ENGINE GENERATOR SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide diesel generator set of one of the following:
   1. Generac
   2. Caterpillar
   3. Kholer

B. Furnish and install one (1) standby electric generating system rated for continuous standby service as shown on the Drawings. Voltage shall be 208 volts, 3 phase, 4 wire at 60 hertz. The system shall be a package of new and current equipment consisting of:
   1. A four (4) cycle diesel engine driven electric plant to provide emergency electric power.
   2. Start-stop control system.
   3. Automatic and manual load transfer controls to provide automatic starting and stopping of the unit and switching of the loads.
   4. Mounted accessories as specified.
   5. Remote annunciator panel.
   6. Generator housekeeping concrete pad.
   7. Exhaust system and insulation.
   8. Sub-base fuel storage system and piping.

C. This system shall be built, tested and shipped by the manufacturer and by the alternator so there is one source of supply and responsibility. The performance of the electric plant shall be certified by an independent testing laboratory as to the plant's full power rating, stability and voltage and frequency regulation. Submit certificate of compliance with shop drawings. Furnish detailed summary of testing of unit of this rating in accordance with NFPA-110T.

D. The supplier of this equipment shall maintain a full-time "in-house" parts and service organization within 100 miles of the job site. The manufacturer of this set shall have a minimum of five (5) years of experience in building similar units in this part of this country. This supplier shall have his name, address, and telephone number clearly and visibly located on all equipment. Service shall be available on a 24-hour a day, 7-day a week basis. The supplier shall be authorized by the engine generator manufacturer to provide service and warranty for all generator components.

E. Enclosed with each submittal set shall be the following information:
   1. Unit drawings of all major components showing exact dimension data.
   2. Catalog information on the engine, generator, battery charger, vibration isolators, exhaust silencer, flexible exhaust connector, automatic transfer switch.
   3. A complete bill of material indicating exactly what is to be provided.
   4. A list of at least two (2) similar installation using the same major components as specified herein.
   5. Estimated time, in calendar days, for delivery after approval and release is received.
   6. Furnish engine heat rejection data to jacket water, exhaust, and ambient and total DB measurement of engine, generator, and radiator measured at 23 feet. Mechanical noise

shall not exceed 88 DBA at 23 feet and exhaust noise shall not exceed 94 DBA at 23 feet before the exhaust silencer. Exhaust flow shall not exceed 2500 CFM.

F. Any notation marked on submission of the equipment is outlined in this section by reviewing authority must be responded to in writing, by the equipment manufacturer.

G. Complete engineering submittal, catalog cuts, wiring diagrams, interface drawings, unit drawings, A.C. & D.C. schematics, termination chamber drawings, terminal strip drawings, foundation plan, annunciator panel layout and wiring, etc. must accommodate all shop drawings.

H. This Specification is for furnishing and installing one (1) diesel fueled engine driven generating set rated for continuous standby service KW rating. The KW rating shall be continuously available during any power outage whether the duration is minutes, hours, or days. The unit shall be complete with all accessories, controls, attachments, fuel and exhaust systems. Rating shall be with engine driven radiator fan attached regardless of cooling system specified herein.

I. The operation of this unit shall be automatic such that upon the closing of a remote starting contact, the engine shall start and attain rated voltage and frequency within ten (10) seconds.

J. All necessary accessories shall be provided to assure starting within the time described above under the ambient conditions described herein.

K. The diesel engine shall be water-cooled, 4 cycle industrial type with removable cylinder liners, 1800 rpm type. Other than 1800 rpm type engines or engines which utilize reduction from a higher rpm down to 1800 rpm shall not be approved.

L. Lubrication shall be a full pressure system, using an engine-driven gear-type lube oil pump with replaceable element full flow lube oil filter. Lube oil cooler shall be provided.

M. The engine-mounted fuel system shall include all equipment normally supplied and recommended by the generator set manufactured for emergency generator service.

N. In addition to the engine-mounted fuel system, there shall be a sub-base fuel tank system.
   1. The fuel tank system shall be a 1500 gallon UL listed tank, pressure tested, double walled, trim line construction, sub-base fuel tank. All piping and venting shall be completed by the housing manufacturer prior to shipment. Tank system shall comply with all State and Local Codes. Provide one (1) full tank of fuel after testing at the completion of the project for each generator.

O. Governor: The engine shall be equipped with a hydraulic/electronic isochronous governor capable of maintaining the engine speed from no load to full load within plus or minus .25% of the synchronous speed.

P. Starting System: The engine shall have a 24 VDC starting system with starting motor and starter solenoid switch.

Q. Batteries: One (1) set of starting batteries with cables and steel battery rack and heater shall be included for each starter. Batteries shall be sized for operation at -20° F.
   1. Batteries shall be heavy-duty lead acid type, rated not less than 210 ampere hours each.
   2. A float type battery charger shall maintain the starting batteries at full charge. The charger shall be suitable for wall-mounting and shall have a cranking disconnect relay or current limiting feature. The charger shall be Charles AE2420, Lamarche A46 or equal. The charger shall have high and low voltage alarm relays, and have 20 amp outlet.
   3. There shall be a belt-driven battery charging alternator with regulator and charge rate ammeter for charging the batteries while the engine is running.

R. Engine jacket water heaters and thermostats shall be provided to maintain the engine jacket water at a temperature high enough to assure starting the engine and attaining rated voltage and frequency within 10 seconds. The jacket heaters shall be of the capacity recommended by the engine generator manufacturer to meet above conditions. Input voltage to the heaters shall be 208 volts, 1 phase, 60 cycles.

S. Battery heater shall be thermostatically controlled and shall keep battery at optimum temperature for both operation and battery life.

T. Engine Cooling System:
   1. Engine shall be provided with 130° F ambient unit mounted radiator. Radiator shall have sufficient capacity to dissipate not less than total British thermal units per hour rejected at 100% full-load under the condition specified. Filler cap shall be designed for pressure relief.
   2. Cooling system shall be provided with initial charge of permanent type anti-freeze solution containing rust inhibitor.
   3. Water-cooled manifold shall be furnished.

U. The engine shall be equipped with safety shutdown contacts for:
   1. Low lube oil pressure, prewarn and shutdown.
   2. High jacket water temperature, prewarn and shutdown.
   3. Overspeed.
   4. Overcrank.
   5. Low water level, prewarn.
   6. Low water temperature, prewarn.

V. The following manufacturer recommended electrical instruments and devices shall be included in the generator control panel.

W. The following engine instruments shall be included in the generator control panel:
   1. Lube oil pressure.
   2. Water temperature.
   3. D.C. voltmeter.
   4. Tachometer.
   5. Any other instruments and devices considered necessary by the Manufacturer shall be included.

X. An exhaust silencer suitable for critical type silencing (complete with condensate drains) shall be supplied of the size recommended by the generator set manufacturer. Silencer shall be equal to Maxim Model M51. An octave band center frequency, in hertz, data sheet shall accompany all muffler shop drawings. Silencer shall include side inlet and companion flanges, nuts, boxes, and gaskets.

Y. A section of seamless, flexible stainless steel exhaust piping of the size and type recommended by the generator set manufacturer.

Z. The engine and generator shall be close-coupled and mounted on a structural steel base designed to maintain proper alignment of the unit.

AA. The unit shall be certified by the manufacturer to be free from any critical torsional vibrations within a range of plus or minus 10% of synchronous speed.

BB. Vibration isolators of spring type shall be supplied with the unit. The number of isolators shall be as recommended by the generator set manufacturer, and shall be mounted within the enclosure.

CC. Rating as shown on the drawings and with the following characteristics:
   1. Type-revolving field, 4 pole, single-bearing, drip proof, 93% efficiency at nameplate rating.
   2. Exciter: Brushless, direct connected, fully tropicalized, SCR rectifiers, static voltage regulator, rheostat, excellent motor starting capability.
   3. Voltage Regulation: Plus or minus 1/2% of any preset valve over the 3 phase load range. Instantaneous voltage dip or rise when measured with an oscilloscope, will not exceed 20% upon full load application, and will return to preset valve within 0.5 seconds. Voltage regulator shall be 3 phase sensing, provide volts/hertz regulation,

provide over-voltage and under-voltage protection, and shall include a solid state circuit to remove excitation when generator is overloaded for more than 10 seconds.

4. Waveform: Deviation factor of output voltage will not exceed 5% and the valve of any individual harmonic will not exceed 2% of the fundamental when operating with an unbalanced load.
5. Temperature Rise: Temperature rise of any component will not exceed the rise permitted by NEMA standards.
6. Rotor: One-piece lamination welded and secured to shaft by a key and press fit. Amortisseur windings installed and connected between poles as an acid to parallel operation and improve wave form during unbalanced loads. Field coil machine wound on insulated pole body and securely braced. Rotor statically and dynamically balanced.
7. Stator: One-piece lamination welded together. Stator coils from wound and place in insulated slots. Starter pressed and welded in a rigid steel frame.
8. Bearing: Double-sealed ball bearing, lubricated for life.
9. Insulation: NEMA Class F insulation.
10. Varnish: Three (3) coats modified polyester type, will not support fungus growth.
11. Cooling: Cast aluminum fan mounted on generator shaft.

DD. The engine generator shall be supplied with a flush mount remote annunciator panel with faceplate mounted to annunciation terminal strip to give remote indication of the running characteristics of the generator.

EE. The entire generator set shall be enclosed in a weatherproof enclosure constructed of aluminum throughout. The housing shall be designed to accommodate heavy snowloads and shall be equipped with motorized intake and exhaust louvers, prewired prior to shipment. Housing shall be Pritchard Brown #9930 and shall be constructed per BOCA requirements and certified by a Structural Engineer registered in the State where the job is being constructed.

FF. Housing shall have five (5) hinged, lockable, keyed alike doors with stainless steel hardware. The doors shall be so arranged as to provide access to vital parts of the generator set for service. Oil pan well and oil drain extension shall be included. Coolant drain and oil drain shall be extended outside housing with lockable rustproof valves.

GG. Housing shall be prepainted with aluminum exterior, finish as selected by the Architect at the time of submission. Interior shall be anodized aluminum. Floor of enclosure shall be 3/16” diamond plate backed by 3/4" plywood for rigidity.

HH. Housing shall include sound attenuation with thickness and type of sound insulation and intake and exhaust baffles necessary to achieve a sound level of 70 dB at 50-‘0” in any direction. There shall be no puretone. Walls and ceiling shall be lined with perforated aluminum liner. Intake louvers shall be located on opposite sides of enclosure. Complete exhaust system shall be furnished, installed/insulated and mounted within the housing, by Housing Manufacturer prior to shipment.

II. Housing shall be equipped with indoor/outdoor, LED fixtures with lamps and on/off switch to operate on normal power or generator power and a DC lighting unit to operate on generator battery. DC lights shall have time switch.

JJ. Housing shall be completely wired prior to shipment including circuit breaker panelboard and stepdown transformers, wired to battery charger, jacket water heaters and lighting. Service shall be 120/208V, 3 phase, 4 wire, 60 amp (minimum).

KK. Diesel fuel base tank shall be mounted beneath enclosure and prepiped and vented in accordance with UL prior to shipment.

LL. Submit detailed generator pad requirements with Shop Drawings. Refer to plans for minimum requirements.

2.23 AUTOMATIC TRANSFER SWITCH

A. Furnish the automatic transfer switches to automatically transfer between the normal and emergency power source.
B. The automatic transfer switches covered by these specifications shall be designed, tested, and assembled in strict accordance with all applicable standards of ANSI, U.L. IEEE and NEMA.
C. The automatic transfer switch shall be furnished as shown on the drawings. Voltage and continuous current ratings and number of poles shall be as shown.
D. On 3 phase, 4 wire systems, utilizing ground fault protection, a true 4 pole switch shall be supplied with all 4 poles mounted on a common shaft. The continuous current rating and the closing and withstand rating of the 4^{th} pole shall be identical to the rating of the main poles.
E. The transfer switch shall be mounted in a NEMA 1 enclosure, unless otherwise indicated. Enclosures shall be fabricated from 12 gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008.
F. The transfer switch shall be equipped with an internal welded steel pocket, housing an operations and maintenance manual.
G. The transfer switch shall be top and bottom accessible.
H. The main contacts shall be capable of being replaced without removing the main power cables.
I. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.
J. All bolted bus connections shall have Belleville compression type washers.
K. When a solid neutral is required, a fully rated bus bar with required AL-CU neutral lugs shall be provided.
L. Control components and wiring shall be front accessible. All control wires shall be multiconductor 18 gauge 600 volt SIS switchboard type point to point harness. All control wire terminations shall be identified with tubular sleeve-type markers.
M. The switch shall be equipped with 90° C rated copper/aluminum solderless mechanical type lugs.
N. The complete transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.
O. The transfer switch shall be double throw, actuated by two (2) electric operators momentarily energized, and connected to the transfer mechanism by a simple over center type linkage. Minimum transfer time shall be 400 milliseconds.
P. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungston alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.
Q. The transfer switch shall be equipped with a safe manual operator, designed to prevent injury to operating personnel. The manual operator shall provide the same contact-to- contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly. The manual operator shall be safety operated from outside of the transfer switch enclosure while the enclosure door is closed.

R. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have a real time clock with Nicad battery backup.
S. The CPU shall be equipped with self-diagnostics with a watchdog/power fail circuit.
   1. The controller shall have password protection required to limit access to qualified and authorized personnel.
   2. The controller shall include a 20 character, LCD display, with a keypad, which allows access to the system.
   3. The controller shall include 3 phase over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and emergency sources.
T. The controller shall be capable to storing the following records in memory for access either locally or remotely:
   1. Number of hours transfer switch is in the emergency position (total since record reset).
   2. Number of hours emergency power is available (total since record reset)
   3. Total transfer in either direction (total since record reset).
   4. Date, time, and description of the last four (4) source failures.
   5. Date of the last exercise period.
   6. Date of record reset.
U. Sequence of Operation:
   1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increases to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-9999 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant.
   2. The transfer switch shall transfer to emergency when the generating plant has reached specified voltage and frequency on all phases.
   3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-9999 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source.
   4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-9999 seconds, factory set at 300 seconds.
V. Automatic Transfer Switch Accessories:
   1. Programmable 3 phase sensing of the normal source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.
   2. Programmable 3 phase sensing of the emergency source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.
   3. Time delay for override of momentary normal source power outages (delays engine start signal and transfer switch operation). Programmable 0-9999 seconds. Factory set at 3 seconds.

4. Time delay to control contact transition time on transfer to either source. Programmable 0-9999 seconds, factory set at 3 seconds.
5. A maintained type load test switch shall be included to simulate a normal power failure, keypad initiated.
6. A remote type load test switch shall be included to simulate a normal power failure, remote switch initiated.
7. A time delay bypass on retransfer to normal shall be included. Keypad initiated.
8. Contact, rated 10 amps 30 volts DC, to close on failure of normal source to initiate engine starting.
9. Contact, rated 10 amps 30 volts DC, to open on failure of normal source for customer functions.
10. A plant exerciser shall be provided within ten (10) 7-day events, programmable for any day of the week and 24 calendar events, programmable for any month/day, to automatically exercise generating plant programmable in 1 minute increments. Also, include selection of either “no load” (switch will not transfer) or “load” (switch will transfer) exercise period. Keypad initiated.
11. Two (2) auxiliary contacts rated 10 amp, 120 volts AC shall be mounted on the main shaft, one (1) closed on normal and the other closed on emergency. Both contacts will be wired to a terminal strip for each of customer connections.
12. A 3-phase digital LCD voltage readout, with 1% accuracy shall display all three separate phase to phase voltages simultaneously, for both the normal and emergency source.
13. A digital LCD frequency readout with 1% accuracy shall display frequency for both normal and emergency source.
14. An LCD readout shall display normal source and emergency source availability.

W. As a condition of approval, the manufacturer of the automatic transfer switches shall verify that their switches are listed by Underwriters Laboratories, Inc., Standard UL-1008 with 3-cycle short circuit closing and withstand as follows:
   1. 65k RMS Symmetrical Amperes 480 VAC.

X. The transfer switch manufacturer shall employ a nationwide factory-direct, field service organization, available on a 24-hour a day, 365 days a year, call basis.

Y. The manufacturer shall include an 800 telephone number, for field service contact, affixed to each enclosure.

Z. The manufacturer shall maintain records of each transfer switch, by serial number, for a minimum of 20 years.

PART 3 – EXECUTION

3.1 BASIC REQUIREMENTS

A. Adhere to best industry practice and the following:
   1. All work shall be concealed.
   2. Route circuitry runs embedded in concrete to coordinate with structural requirements.
   3. Equip each raceway intended for the future installation of wire or cable with a nylon pulling cord 3/16” in diameter and clearly identify both ends of the raceway.
   4. Provide all outlet boxes, junction boxes, and pull boxes for proper wire pulling and device installation. Include those omitted from the drawings due to symbolic methods of notation.
   5. Utilize lugs of the limited type to make connections at both ends of cables installed on the line side of main service overcurrent and switching devices. Provide cable limiters for each end of each service entrance cable.
   6. Beyond the termination of raceways, fireproof the following:

a. All wires and cables within pad-mounted transformer enclosure.
b. All service feeder cables ahead of main service overcurrent protection devices, and elsewhere where not in raceways.

7. Fireproofing of wires and cables shall be by means of a half-lapped layer of arcproof or by means of sleeving of a type specifically manufactured for the purpose. Ends of tape or sleeving shall be severed with twine. Fireproofing shall be extended up into raceways. After conductors have been finally shaped into their permanent configuration, fireproofing tape or sleeving shall be coated with silicate of soda (water glass). Fireproofing shall be applied in an overall manner to raceway groupings of conductors.
8. Provide all sleeves through fireproof and waterproof slabs, walls, etc., required for electric work.
9. Provide waterproof sealing for the sleeves through waterproof slabs, walls, etc.
10. Provide fireproof sealing for the sleeves through fireproof walls, slabs, etc.
11. Provide fireproof sealing for the openings in fireproof walls, slabs, etc., resulting from removal of existing electrical sleeves, conduits, poke-thru's etc.
12. No splicing of wires will be permitted in the Fire Alarm System.
13. Bundle wiring passing through pull boxes and panelboards in a neat and orderly manner with plastic cable ties. Cable ties shall be by Ty-Raps as manufactured by Thomas & Betts, Holub Industries Inc., Quick Wrap, Bundy Unirap, or equal.
14. Turn branch circuits and auxiliary system wiring out of wiring gutters at 90 degrees to circuit breakers and terminal lugs.

3.2 TESTING REQUIREMENTS & INSTRUCTIONS

A. Where any repairs, modifications, adjustments, tests or checks are to be made, the Contractor shall contact the Engineer to determine if the work should be performed by or with the Manufacturer's Representative.
B. Tests are to:
   1. Provide initial equipment/system acceptance.
   2. Provide recorded data for future routine maintenance and trouble-shooting.
   3. Provide assurance that each system component is installed satisfactorily and can be expected to perform, and continue to perform its specified function with reasonable reliability throughout the life of the facility.
C. At any stage of construction and when observed, any electrical equipment or system determined to be damaged, or faulty, is to be reported to the Engineer. Corrective action by the Contractor requires prior Engineer approval, retesting, and inspection.
D. When the electrical tests and inspections specified or required within Division 16 are completed and results reported, reviewed, and approved by the Engineer, the Contractor may consider that portion of the electrical equipment system or installation electrically complete. The Contractor will then affix appropriate, approved, and dated completion or calibration labels to the tested equipment and notify the Engineer of electrical completion. If the Engineer finds completed work unacceptable, he will notify the Contractor in writing of the unfinished or deficient work, with the reason for his rejection, to be corrected by the Contractor. The Contractor will notify the Engineer in writing when exceptions have been corrected. The Contractor will prepare a "Notification or Substantial Electrical Completion" for approval by the Engineer following Engineer's acceptance of electrical completion. If later in-service operation or further testing identified problems attributable to the Contractor, these will be corrected by the Contractor, at no additional cost to the Authority.
E. Grounding Systems:

1. Test main building loops and major equipment grounds to remote earth, directly referenced to an extremely low resistance (approximately 1 ohm) reference ground benchmark. Perform a visual inspection of the systems, raceway and equipment grounds to determine the adequacy and integrity of the grounding. Ground testing results shall be recorded, witnesses, and submitted to the Engineer.
2. Perform ground tests using a low resistance, null-balance type ground testing ohmmeter, with test lead resistance compensated for. Use the type of test instrument which compensates for potential and current rod resistances.
3. Test each ground rod and measure ground resistance. If resistance is not 10 ohms or less, drive additional rods to obtain a resistance of 10 ohms or less. Submit tabulation of results to Engineer. Include identification of electrode, date of reading and ground resistance valve in the test reports.
4. Test each building and major equipment grounding system for continuity of connections and for resistance. Ground resistance of conduits, equipment cases, and supporting frames, shall not exceed 5 ohms to ground. Submit all readings to the Engineer.
5. Where ground test results identify the need for additional grounding conductors or rods that are not indicated or specified, design changes will be initiated to obtain the acceptable values. The Contractor is responsible for the proper installation of the grounding indicated and specified.
6. Operating Instructions: Furnish operating instructions to Owner's designated representative with respect to operations, functions and maintenance procedures for equipment and systems installed. Cost of such instruction up to a full five (5) days of Electrical Subcontractor's time shall be included in contract. Cost of providing a Manufacturer's Representative at site for instructional purposes shall also be included.

3.3 BRANCH CIRCUITRY

A. For all lighting and appliance branch circuitry, raceway sizes shall conform to industry standard maximum permissible occupancy requirements except where these are exceeded by other requirements specified elsewhere.
B. Circuits shall be balanced on phases at their supply as evenly as possible.
C. Feeder connections shall be in the phase rotation which establishes proper operation for all equipment supplied.
D. Reduced size conductors indicated for any feeders shall be taken as their grounding conductors.
E. Feeders consisting of multiple cables and raceways shall be arranged such that each raceway of the feeder contains one (1) cable for each leg and one (1) neutral cable, if any.
F. For circuitry indicated as being protected at 20 Amps or less, abide by the following:
   1. All 20 amp, 120/208 volt, 3-phase, 4-wire combined branch circuit homeruns shall be provided with a #8 AWG neutral conductor.
   2. Minimum conductor size shall be No. 12 AWG cooper.
   3. Conductors operating at 120 volts extending in excess of 100 ft. or at 277 volts extending in excess of 200 ft., or the last outlet or fixture tap shall be No. 10 AWG cooper throughout.
   4. Lighting fixtures and receptacles shall not be connected to the same circuit.
G. Type MC Cable Installation:
   1. Where cable is permitted under the products section, the installation of same shall be done in accordance with code and the following:
      a. Cable shall be supported in accordance with code. Tie wire is not an acceptable means of support. Cable supports such as Caddy WMX-6, MX-3, and clamps such as Caddy 449 shall be used. Where cables are supported by the structure and only

need securing in place, then ty-raps will be acceptable. Ty-raps are not acceptable as a means of support. All fittings, hangers, and clamps for support and termination of cables shall be of type specifically designed for use with cable, i.e., romex connectors not acceptable.

b. Armor of cable shall be removed with rotary cutter device equal to roto-split by Seatek Co.; not with a hacksaw.
c. Use split “Insuliner” sleeves at terminations.

3.4 REQUIREMENTS GOVERNING ELECTRICAL WORK IN DAMP OR WET LOCATIONS

A. Outlets and outlet size boxes shall be of galvanized cast ferrous metal only.
B. The finish of threaded steel conduit shall be galvanized only.
C. Wires for pulling into raceways for lighting and appliance branch circuitry shall be limited to “THWN”.
D. Wires for pulling into raceways for feeders shall be limited to “THWN”.
E. Plates for toggle switches and receptacles shall have gasketed snap shut covers suitable for wet locations while in use.
F. Final connections of flexible conduit shall be neoprene sheathed.
G. Apply one (1) layer of half looped plastic electric insulating tape over wire nuts used for joining the conductors of wires.
H. Enclosures, junction boxes, pull boxes, cabinets, cabinet trims, wiring troughs and the like, shall be fabricated of galvanized sheet metal, shall conform to the following:
   1. They shall be constructed with continuously welded joints and seams.
   2. Their edges and weld spots shall be factory treated with cold galvanizing compound.
   3. Their connection to circuitry shall be by means of watertight hub connectors with sealing rings.
I. Enclosures for individually mounted switching and overcurrent devices shall be NEMA Class IV weatherproof construction.
J. The covers, doors and plates and trims used in conjunction with all enclosures, pull boxes, outlet boxes, junction boxes, cabinets and the like shall be equipped with gaskets.
K. Panels shall be equipped with doors without exception.
L. The following shall be interpreted as damp or wet locations within building confines:
   1. Spaces where any designations indicating weatherproof (WP) or vapor proof appear on the drawings.
   2. Below waterproofing in slabs applied directly on grade.
   3. Spaces defined as wet or damp locations by Article 100 of the National Electric Code.
   4. Parking garage.

3.5 REQUIREMENTS GOVERNING ELECTRIC WORK IN AIR HANDLING SPACES

A. Within air handling ductwork or plenums (other than spaces within suspended ceilings used for air handling purposes), Area “B” and the media shall comply with requirements for return air plenums.
B. Abide by the requirements specified for electric work in damp locations within building confines.
C. Where circuitry passes through duct walls, include, in accordance with instructions issued in the field, airtight sealing provisions which allow for a relative movement between the circuitry and the duct walls.
D. Exclude the installation of type NM or NMC cable.

E. In spaces within suspended ceilings used for air handling purposes, abide by the requirements specified for normal electric work conditions except:
F. Lighting fixtures recessed into the ceilings shall be certified as being suitable for this purpose.

3.6 UNDERGROUND CONDUIT DUCT BANKS

A. The electrical work required in conjunction with underground conduit banks shall include providing all conduits.
B. Conduits for underground banks shall be:
   1. Trade diameter size as indicated but in no case less than one inch.
   2. Polyvinyl chloride Schedule 40 (approved for encased burial) duct, rigid steel conduit for vertical elbows and straight sections used to penetrate equipment pads, building foundation walls and concrete slabs.
C. All conduits indicated as being incorporated into conduit banks unless specifically noted as rigid steel conduits shall be encased in a concrete envelope which accommodates the indicated configuration of conduits and which encompasses dimensions as follows:
   1. Outside surfaces of conduits to outside surface of envelope where reinforcement of encasement is required – 6” minimum.
   2. Outside surfaces of conduits to outside surface of envelope where no reinforcement of encasement is required – 3” minimum.
   3. Spacing between centerlines of conduits assigned to different categories of use primary feeders, secondary feeders, communications and signaling – 10-1/2” minimum.
   4. Spacing between centerlines of conduits assigned to the same category of use – 7-1/2” minimum.
D. Reinforcement of the concrete encasement for conduit banks where required shall consist of No. 4 longitudinal reinforcing bars located 3” from the outside surface of the envelope and spaced 6” on centers all around. No. 8 wire reinforcing hoops set 8” apart shall be used to tie the longitudinal bars together.
E. Install conduit in such a manner as to provide a minimum cover of 30 inches after final grading except the cover may be reduced to a minimum of 18 inches to:
   1. Tie into existing work.
   2. Pass over other underground utilities.
   3. Pass over underground obstructions.
   4. Assist in the avoidance of low points.
F. Increase the minimum cover where required by field conditions.
G. Lay conduit to avoid low points during run. Pitch at a minimum of 3 inches per 100 feet away from building.
H. Provide reinforcement for the concrete encasement of a conduit bank where:
   1. It passes under or over underground utilities.
   2. It passes under or over underground obstructions.
   3. Its cover is reduced to less than 30 inches.
   4. It runs through foundation walls and other building construction.
I. Concrete encasement reinforcing shall extend in each case 5 feet beyond the points at which the determining conditions terminate.
J. Bends in conduit shall have minimum radii as follows:
   1. For primary feeder 15’-0” except where specifically indicated otherwise or where turning up at termination point.
   2. For primary feeder turning up at termination point – 4’-0”.
K. Install conduit so that adjacent joints are staggered at least 6 inches from one another.

L. Offsets to accommodate field conditions shall be accomplished with two (2) bends of not more than ten (10) degrees each.
M. Plug both ends of all conduit stubs.
N. Seal the end of each conduit run terminating inside a building utilizing a water and gas-tight sealant manufactured specifically for the purpose.
O. After conduit has been installed with concrete encasement completed, clear each conduit of all obstructions and foreign matter by pulling a flexible mandrel (12” minimum length and a diameter 1/4" less than that of the conduit) and brush through it. In the event that obstructions are encountered in any conduit which will not permit the mandrel to pass, remove and replace the blocked section. Include in the electric work all excavation, backfilling, repair of concrete encasement and restoration of surface at grade involved in the conduit replacement.
P. Provide a nylon cord for the pulling of cable in each conduit in which no cable is to be installed as part of the electric work.
Q. The Electrical Sub-Contractor shall provide all insulated racks as required for proper support of all cables and wires.
R. Provide a continuous nylon warning tape above each full length of duct bank 12 inches below grade.

3.7 LIMITING NOISE PRODUCED BY ELECTRICAL INSTALLATION

A. Perform the following work, in accordance with field instructions issued by the Architect to assure that minimal noise is produced by electrical installations due to equipment furnished as part of the electrical work.
B. Check and tighten the fastenings of sheet metal plates, covers, doors and trims used in the enclosures of electrical equipment.
C. Remove and replace any individual device containing one or more magnetic flux path metallic cores (e.g., discharge lamp ballast, transformer, reactor, dimmer, and solenoid) which is found to have a noise output exceeding that of other identical devices installed at the project.

3.8 SUPPORTS AND FASTENINGS

A. Support work in accordance with best industry standards, and Local Electric Code.
B. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a free standing position.
C. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members. They shall be rigidly bolted or welded together and adequately braces to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of all equipment mounted on them.
D. No work intended for exposed installation shall be mounted directly on any building surface. In such locations, flat bar members or spaces shall be used to create a minimum of ¼” air space between the building surfaces and the work. Provide ¾” thick exterior grade plywood painted with two (2) coats of fire-retardant gray paint for mounting of panelboards.
E. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric conduits, raceways or cables for support.
F. Nothing shall rest on, or depend for support on, suspended ceiling media.
G. Support less than 2” trade size, vertically run, conduits at intervals no greater than 8’. Support such conduits, 2-1/2” trade size or larger, at intervals no greater than they story height, or 15’, whichever is smaller.

H. Where they are not embedded in concrete, support less than 1" trade size, horizontally run, conduits at intervals no greater than 7'. Support such conduits, 1" trade size or larger, at intervals no greater than 10'.
I. Support all lighting fixtures directly from structural slab, deck or framing member.
J. Where fixtures and ceilings are such as to require fixture support from ceiling openings frames, include in the electric work the members necessary to tie back the ceiling opening frames to ceiling suspension members or slabs so as to provide actual support for the fixtures noted above.
K. As a minimum procedure, in suspended ceilings support smalls runs of circuitry (e.g., conduit not in excess of 1" trade size) from ceiling suspension members as defined above. Support larger runs of circuitry directly from structural slabs, decks or framing members.
L. Fasten electric work to building structure in accordance with the best industry practice.
M. Floor mounted equipment shall not be held in place solely by its own dead weight. Include floor anchor fastenings in all cases.
N. For items which are shown as being ceiling mounted at locations where fastenings to the building construction element above is not possible, provide suitably auxiliary channel or angle iron bridging tying to building structural elements.
O. As a minimum procedure, where weight applied to the attachment points is 100 lbs. or less, fasten to concrete and solid masonry with bolts and expansion shields.
P. As a minimum procedure, where weight applied to building attachment points exceed 100 lbs., but is 300 lbs. or less, conform to the following:
    1. At field poured concrete slabs, utilize inserts with 20' minimum length slip-through steel rods, set transverse to reinforcing steel.

3.9 SPLICING AND TERMINATING WIRES AND CABLES

A. Maintain all splices and joints in removable cover boxes or cabinets where they may be easily inspected.
B. Locate each completed conductor splice or joint in the outlet box, junction box, or pull box containing it, so that it is accessible from the removal cover side of the box.
C. Join solid conductors No. 8 AWG and smaller by securely twisting them together and soldering, or by using insulated coiled steel spring "wire nut" type connectors. Exclude "wire nuts" employing non-expandable springs. Terminate conductors No. 8 AWG and smaller by means of a neat and fast holding application of the conductors directly to the binding screws or terminals of the equipment or devices to be connected.
D. Join, tap and terminate standard conductors No. 6 AWG and larger by means of solder sleeves, taps, and lugs with applied solder or by means of bolted saddle type or pressure indent type connectors, taps and lugs. Exclude connectors and lugs of the types which apply set screws directly to conductors. Where equipment or devices are equipped with set screw type terminals which are impossible to change, replace the factory supplied set screws with a type having a ball bearing tip. Apply pressure indent type connectors, taps and lugs utilizing tools manufactured specifically for the purpose and having features preventing their release until the full pressure has been exerted on the lug or connector.
E. Except where wire nuts are used, build up insulation over conductor joints to a value, equal both in thickness and dielectric strength, to that of the factory applied conductor insulation. Insulation of conductor taps and joints shall be by means of half-lapped layers of rubber tape, with an outer layer of friction tape; by means of half-lapped layers of approved plastic electric insulating tape; or by a means of split insulating casings manufactured specifically to insulate the particular connector and conductor, and fastened with stainless steel or non-metallic snaps or clips.

3.10 PULLING WIRES INTO CONDUITS AND RACEWAYS

A. Delay pulling wires or cables in until the project has progressed to a point when general construction procedures are not liable to injure wires and cables, and when moisture is excluded from raceways.
B. Utilize nylon snakes or metallic fish tapes with ball type heads to set up for pulling. In raceways 2" trade size and larger, utilize a pulling assembly ahead of wires consisting of a suitable brush followed by a 3-1/2" diameter ball mandrel.
C. Leave sufficient slack on all runs of wire and cable to permit the secure connection of devices and equipment.
D. Include circular wedge-type cable supports for wires and cables at the top of any vertical raceway longer than 20 feet. Also include additional supports spaced at intervals which are no greater than 10'. Supports shall be located in accessible pull boxes. Supports shall be of a non-deteriorating insulating material manufactured specifically for the purpose.
E. Pulling lubricants shall be used. They shall be products manufactured specifically for the purpose.

3.11 REQUIREMENTS FOR THE INSTALLATION OF JUNCTION BOXES, OUTLET BOXES AND PULL BOXES

A. Flush wall-mounted outlet boxes shall not be set back to back but shall be offset at least 12" horizontally regardless of any indication on the drawings.
B. Locate all boxes so that their removable covers are accessible without necessitating the removal of parts of permanent building structure, including piping, ductwork, and other permanent mechanical elements.
C. In conjunction with concealed circuitry, abide by one of the following instructions (as may be applicable to the conditions) in order to assure the aforementioned accessibility. (Not required for circuitry concealed by removable suspended ceiling tiles.)
D. For a small (outlet size) box on circuitry concealed in a partition or wall, locate box or fitting so that its removable cover side, (or the face of any applied raised cover) penetrates through to within 1/8" of the exposed surface of the building materials concealing the circuitry and apply a blank or device plate to suit the functional requirements.
E. For a large box on circuitry concealed in a partition, suspended ceiling, or wall, locate box totally hidden but with its removable cover directly behind an architectural access door or panel (included for the purpose, separate from the electric work) in the building construction which conceals the circuitry.
F. Include all required junction and pull boxes regardless of indications on the drawings (which, due to symbolic methods of notation, may omit to show some of them).
G. Unless noted below or otherwise specifically indicated, include a separate outlet box for each individual wiring device, lighting fixture and signal or communication system outlet component. Outlet boxes supplied attached to lighting fixtures shall not be used as replacements for the boxes specified herein.
H. Utilize an outlet box no smaller than 5" square by 2-1/2" deep.
I. Allow no fixture to be supplied from an outlet box in another room.
J. Multiple local switches indicated at a single location shall be gang-mounted in a single outlet box.
K. Install junction boxes, pull boxes and outlet boxes in conjunction with concealed circuitry.

L. Close up all unused circuitry openings in outlet boxes. Unused openings in cast boxes shall be closed with approved cast metal threaded plugs. Unused openings in sheet metal boxes shall be closed with sheet metal knock-out plugs.
M. Outlet boxes for switches shall be located at the strike side of doors. Indicate door swings are subject to field change. Outlet boxes shall be located on the basis of final door swing arrangements.
N. Boxes and plaster covers for duplex receptacles shall be arranged for vertical mounting of the receptacle.
O. Equip outlet boxes used for devices which are connected to wires of systems supplied by more than one set of voltage characteristics with barriers to separate the different systems.
P. Barriers in junction and pull boxes of outlet size shall be of the same metal as the box.
Q. Barriers in junction and pull boxes which are larger than outlet size shall be of the polyester resin fiberglass of adequate thickness for mechanical strength, but in no case less than 1/4" thick. Each barrier shall be mounted, without fastenings, between angle iron guides so that they may be readily removed.

3.12 LOCATING AND ROUTING OF CIRCUITRY

A. In general, all circuitry shall be run concealed except that it shall be run exposed where the following conditions occur:
   1. Horizontally at the ceiling of permanently unfinished spaces which are not assigned to mechanical or electrical equipment.
   2. Horizontally and vertically in mechanical equipment spaces.
   3. Horizontally and vertically in electric equipment rooms.
B. Concealed circuitry shall be so located that building construction materials can be applied over its thickest elements without being subject to spalling or cracking.
C. All circuitry and raceways shall not be run within slabs. If field conditions requires raceways to be embedded in field-poured structural building construction concrete fill or slab shall conform to the following:
   1. Where turned up or down into a wall or partition they shall, before entering same, be routed parallel for a long enough distance to assure that no relocation of the wall or partition will be necessary to conceal the required bend.
   2. They shall be routed in such a manner as to coordinate with the structural requirements of the building.
   3. They shall be routed in accordance with field instructions issued by the Architect where such instructions differ from specifications set forth herein.
D. Circuitry run exposed shall be routed parallel to building walls and column lines.
E. Circuitry shall be routed so as to prevent electric conductors from being subject to high ambient temperature. Minimum clearances from heated lines or surfaces shall be maintained as follows:
   1. Crossing where uninsulated: 3”.
   2. Crossing where insulated: 1”
   3. Running parallel where uninsulated: 36”.
   4. Running parallel where insulated: 6”.
F. Circuitry shall not be run in elevator shafts, hoistways, and the like. Where outlets for trail cables, pit lights, run be level lights, and the like, are involved, only the “final connection” outlet boxes themselves shall be located within or open into, the confines of the shaft.

3.13 INSTALLING CIRCUITRY

A. The outside surface of circuitry, which is to be embedded in cinder concrete, shall be coated with asphaltum paint.
B. In runs of conduit or raceway including flexible limit the number of bends between cable access points to a total which does not exceed the maximum specified for the particular system. Where no such maximum is specified, limit the number to four (4) right angle bends or the equivalent thereof.
C. In each conduit or raceway assigned for the future pulling in of wires, include a nylon drag cord. In raceways 2” trade size and larger, the cord shall be pulled in utilizing a suitable brush, followed by an 85% diameter ball mandrel ahead of the cord in the pulling assembly. In the event that obstructions are encountered, which will not permit the drag cord to be installed, the blocked section of raceway shall be replaced and any cutting and patching of the structure involved in such replacement shall be included as part of the electric work.
D. Circuitry shall be arranged such that conductors of one feeder or circuitry carrying “going” current are not separated from conductors of the same feeder or circuitry carrying “return” current by any ferrous or other metal. Where not within raceways, all “going” and “return” current conductors of one feeder or circuit shall be laced together so as to minimize induction heating of adjacent metal components.
E. Sleeves used where circuitry is to penetrate waterproof slabs, decks and walls, shall be of a type selected to suit the water condition encountered in the field.

END OF SECTION