PROJECT MANUAL FOR

SUMMER 2020 H/LS IMPROVEMENTS
CAHOKIA USD #187
CAHOKIA, ST. CLAIR COUNTY, ILLINOIS
HR# 150-2229

Prepared for

Cahokia USD #187
1700 Jerome Lane
Cahokia, Illinois 62206

Arnett Harvey, Superintendent

January 20, 2020

Bid Package No. _______
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CAHOKIA USD #187  
CAHOKIA, ST. CLAIR COUNTY, ILLINOIS  
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Specifiers:
GENERAL/ARCHITECTURAL/MECHANICAL/ PLUMBING: Timothy L. Downen, AIA, LEED AP

ELECTRICAL: Mark A. Ritter, PE
DOCUMENT 00 11 16 - INVITATION TO BID

Project: SUMMER 2020 H/LS IMPROVEMENTS
CAHOKIA USD #187
CAHOKIA, ST. CLAIR COUNTY, ILLINOIS
HR# 150-2229

Owner: CAHOKIA USD #187
1700 JEROME LANE
CAHOKIA, ILLINOIS 62206

Architect/Engineer: HURST-ROSCHE, INC.
1400 E. TREMONT ST.
HILLSBORO, ILLINOIS 62049

Date: January 20, 2020

The Owner will receive Bids until 2:00 PM local prevailing time on Tuesday, the 4th day of February, 2020, at Cahokia USD #187 Unit Office, 1700 Jerome Lane, Cahokia, Illinois for the following work:

BASE BID PACKAGE A - WIRTH MIDDLE SCHOOL: The scope of work is the renovation of existing toilet rooms. The scope also includes the abatement of asbestos containing floor tile and floor tile mastic utilizing infrared heat methods, including the removal of associated base material and installation of new vinyl flooring and rubber base. The scope also includes new suspended acoustical panel ceilings and lighting throughout classrooms and new abuse resistant ceilings and lighting in the gymnasium.

BID PACKAGE A ALTERNATE BID #1: Replace ceramic tile flooring and base material identified in Base Bid A with quartz epoxy flooring.

BID PACKAGE A ALTERNATE BID #2: Replace wall mounted lavatories in portions of the project with plastic laminate counter tops, counter brackets, drop in sinks, and additional wall/ceramic tile construction.

BASE BID PACKAGE B - LALUMIER ELEMENTARY SCHOOL: The scope of work is the renovation of existing toilet rooms. The scope also includes new suspended acoustical panel ceilings and lighting throughout classrooms as well as miscellaneous classroom and exterior door replacements.

BID PACKAGE B ALTERNATE BID #1: Replace ceramic tile flooring and base material identified in the Base Bid B with quartz epoxy flooring.

BASE BID PACKAGE C - PENNIMAN, ELIZABETH MORRIS AND MAPLEWOOD ELEMENTARY SCHOOLS: The scope of work is the renovation of existing toilet rooms at Penniman and Maplewood Elementary Schools. The scope also includes miscellaneous classroom and exterior door replacements at all three schools.
BID PACKAGE C ALTERNATE BID #1: Replace ceramic tile flooring and base material identified in the Base Bid C with quartz epoxy flooring.

BASE BID PACKAGE D - HUFFMAN ELEMENTARY SCHOOL: The scope of work is the renovation of existing toilet rooms. The scope also includes miscellaneous classroom and exterior door replacements.

BID PACKAGE D ALTERNATE BID #1: Replace ceramic tile flooring and base material identified in the Base Bid D with quartz epoxy flooring.

A Pre-Bid Meeting will be held at 10:00 AM on Thursday, January 23, 2020 in the Board Room at the Cahokia USD #187 Board of Education Building located at 1700 Jerome Lane, Cahokia, Illinois.

The successful bidder shall enter into the Project Labor Agreement (Section 00 52 15 of the Contract Documents) with the Southwestern Illinois Building Trades Council (SIBTC) and their affiliated local craft unions, for all work as included within these drawings and specifications as a condition of being awarded a contract resulting from this solicitation. Any levels of Subcontractors shall enter into the same Project Labor Agreement.

Drawings and specifications may be obtained at the office of Hurst-Rosche, Inc., 1400 E. Tremont St., Hillsboro, Illinois, after January 20, 2020 by paying the following non-refundable amounts for each Bid Package:

BASE BID PACKAGE A: $100.00 ($110.00 if mailed) for each set of drawings and specifications.
BASE BID PACKAGE B: $50.00 ($60.00 if mailed) for each set of drawings and specifications.
BASE BID PACKAGE C: $50.00 ($60.00 if mailed) for each set of drawings and specifications.
BASE BID PACKAGE D: $30.00 ($40.00 if mailed) for each set of drawings and specifications.

Bidding Documents, Drawings and Specifications, may be examined by prospective bidders and material suppliers at the offices of Hurst-Rosche, Inc., 1400 E. Tremont St., Hillsboro, Illinois, and the following Plan Rooms:

Central Illinois Plan Room, 1620 S. 5th Street, Springfield, IL  62703
Greater Peoria Contractors & Suppliers Association, 1811 West Altorfer Drive, Peoria, IL  61615
Southern Illinois Builders Association, 1468 Green Mount Road, O’Fallon, IL  62269

Drawings and specifications will be available for viewing on the internet at: www.hurst-rosche.com. The documents are being provided for reference purposes only. Bidders are encouraged to obtain a signed and sealed hard copy set of the bidding documents. At a minimum, bidders must obtain clean copies of bid forms from the offices of Hurst-Rosche, Inc. by paying a non-refundable amount of $10.00 to submit a bid for this project.

The Owner requires the project to be complete by August 7, 2020.

Bidders will be required to provide Bid security of a sum no less than 10 percent of the Bid Sum. The bid security shall be either certified check, cashier’s check, bank money order or bid bond issued by surety
licensed to conduct business in the State of Illinois. Hereinafter this bid security shall be referred to as the bid bond.

Submit two copies of your Bid on the Bid Form provided. Bidders may supplement this form as appropriate.

Your Bid will be required to be submitted under a condition of irrevocability for a period of 60 days after submission.

Successful bidders shall be required to observe Illinois Public Act 77-1552 and the Illinois Department of Human Rights and Illinois Human Rights Commission Rules pertaining to Equal Employment Opportunity as provided for in paragraphs 2-101, et seq., Article II, Chapter 68, of the Illinois Revised Statutes; and comply with paragraph 271 of Chapter 48 of the Illinois Revised Statutes concerning the employment of citizens of the State of Illinois; and comply with Chapter 48, Section 39s-1 through 39s-12, of the Illinois Revised Statutes, as amended, known as the Prevailing Wage Determination, as issued by the Illinois Department of Labor.

The Owner reserves the right to accept or reject any or all Bids or any part thereof, to waive any informality in bidding, and to accept bids deemed most favorable to the Owner.

CAHOKIA USD #187

ARNETT HARVEY, SUPERINTENDENT

END OF DOCUMENT
1.1 SUMMARY

A. Document Includes:
   1. Instructions to Bidders.
   2. Site examination.
   3. Prebid conference.

B. Related Documents:
   1. Document 00 11 16 - Invitation To Bid.
   2. Document 00 41 13 - Bid Form - Stipulated Sum.
   3. Document 00 43 00 - Procurement Form Supplements: Appendices A and B.
   4. Document 00 72 14 - General Conditions – AIA Stipulated Sum.
   5. Document 00 73 13 - Supplementary Conditions – AIA.

1.2 INSTRUCTIONS TO BIDDERS

A. These Instructions to Bidders amend or supplement AIA Document A701-1997 - Instructions to Bidders and other provisions of Bidding Documents and Contract Documents.

B. To be considered all bids must in accordance with these Instructions to Bidders.

C. Those interested parties may obtain sets of Drawings and Specifications from the Architects upon payment of the following non-refundable deposits for each Bid Package:
   1. BASE BID PACKAGE A: $100.00 ($110.00 if mailed) for each set of drawings and specifications.
   2. BASE BID PACKAGE B: $50.00 ($60.00 if mailed) for each set of drawings and specifications.
   3. BASE BID PACKAGE C: $50.00 ($60.00 if mailed) for each set of drawings and specifications.
   4. BASE BID PACKAGE D: $30.00 ($40.00 if mailed) for each set of drawings and specifications.

D. At a minimum, bidders must obtain clean copies of bid forms from the offices of Hurst-Rosche, Inc. by paying a non-refundable amount of $10.00 to submit a bid for this project.

1.3 SITE EXAMINATION

A. Bidders shall carefully examine documents and construction site to obtain first-hand knowledge of existing conditions. Contractors will not be given extra payments for conditions which can be determined by examining site and these documents.

B. A visit to Project site has been arranged for Bidders immediately following the Pre-Bid Meeting on January 23, 2020.
1.4  THE SCHEDULE FOR BIDDING THIS PROJECT IS AS FOLLOWS

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<td>B. Pre-Bid Meeting:</td>
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<td>January 23, 2020</td>
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<td>Cahokia USD Administration Building</td>
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<td>C. Latest Time to Submit Request for Interpretation:</td>
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<td>D. Latest Time to Issue an Addendum:</td>
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F. All requests for interpretations shall be in writing via mail or e-mail addressed to the Architect/Engineer and must be received by the date and time identified in Article 1.4 of this section in order to be given consideration. All questions must be submitted on the “Request for Interpretation Pre-Bid Question and Comment Form” included at the end of this section, and questions not submitted in accordance with this form and specified time frame will not be accepted. Any and all interpretations and supplemental instructions will be made by addendum to the Drawings and Specifications and forwarded to all bidders either by certified mail or e-mail. All questions must be submitted in writing to be binding. Any response general in nature or affecting these Instructions to Bidders shall be sent via addendum as previously described. All bidders are required to return the signature page of the addendum signed to the Architect within 24 hours after receipt. Failure of any bidder to receive any such addendum or interpretations shall not relieve such bidder from an obligation under the bid as submitted. All addenda so issued shall become part of the Contract Documents. No addendum will be issued later than the date and time identified in Article 1.4 of this section except one withdrawing the request for Bids or one postponing date for receiving Bids. Oral interpretations, changes or corrections will not be binding and Bidders shall not rely upon such interpretations, changes and corrections. Each Bidder shall ascertain prior to submitting Bid that all addenda issued have been received and shall acknowledge receipt in Bid.

Questions shall be directed to:

e-mail: tdownen@hurst-rosche.com

G. Materials, products and equipment described in Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Each such request shall include name of material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or
other work that incorporation of the substitute would require shall be included. The burden of proof of the merit of proposed substitute is upon the proposer. Architect's decision of approval or disapproval of a proposed substitution shall be final. If the Architect approves any proposed substitution prior to receipt of Bids, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner. No substitutions will be considered after the contract award unless specifically provided in the Contract Documents.

H. Bids shall be made on unaltered Bid Forms furnished by the Architect. Fill in all blank spaces and submit two (2) copies. Bids shall be signed with name typed below signature. Where bidder is a corporation, bids must be signed with legal name of corporation followed by name of state of incorporation and legal signature of an officer authorized to bind the corporation to a contract.

I. Each bidder submitting a bid shall submit on form provided a list of any subcontractors and major suppliers he proposes to use with the bid. Failure to do so could disqualify the bid.

J. Each bidder shall designate on the attached bid form one person who shall serve as the bidder’s contact person for all matters pertaining to the bid. In absence of such designation, the person who signs the bid shall be deemed the bidder contact.

K. Each bid shall be accompanied by bid bond made payable to the Owner, in the amount of ten percent (10%) of the bid sum. Security shall be either certified check, cashier's check, bank money order or bid bond issued by surety licensed to conduct business in the State of Illinois. Successful bidder's security will be retained until he has signed the contract and furnished required payment and performance bonds. Owner reserves the right to retain security of the next two (2) lowest bidders until the lowest bidder enters into contract or until sixty (60) days after bid opening, whichever is shorter. All other bid security will be returned as soon as practicable. If any bidder refuses to enter into a contract, Owner will retain bid security as liquidated damages, but not as a penalty.

L. All costs associated with the preparation and submission of a bid are the sole responsibility of the bidder. These costs shall not be chargeable to the Owner by any successful or unsuccessful bidder. All bids become the property of the Owner and shall not be returned except in the case of a late submission.

M. Simultaneously, with delivery of the executed contract, the successful bidder, at its own expense, shall furnish surety in the form of a performance bond and a labor and material payment bond in the amount of one hundred percent (100%) of the contract amount. Surety for such bonds shall be a company duly authorized and licensed in the State of Illinois and acceptable to the Owner. The Attorney-In-Fact who signs bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

N. All copies of the bid, bid security and any other documents required to be submitted with bid shall be enclosed in a sealed opaque envelope. Envelope shall be addressed to: Cahokia USD #187, 1700 Jerome Lane, Cahokia, IL 62206 and shall be identified with project name, bidder's name and address. Mailed bid envelopes shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face
thereof. Oral, telephonic or telegraphic Bids are invalid and will not receive consideration. Bids shall be deposited at the location designated in the Invitation to Bid prior to time and date designated for opening, or any extension thereof made by addendum. **Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids.** Bids received after time and date for receipt of bids will be returned unopened.

**O.** A bid may not be modified, withdrawn or canceled during the sixty (60) days immediately following bid opening, and each bidder so agrees in submitting his Bid. Any bidder may withdraw, cancel or modify its bid, at any time prior to scheduled time for opening of bids, by letter or telegram actually received by Owner prior to bid time, or, with proper identification, by personally securing bid submitted; if by telegram, written confirmation over signature of bidder shall be mailed and postmarked on or before date and time of bid opening. Withdrawn bids may be resubmitted up to bid opening time provided that they are in full compliance with these Instructions to Bidders.

**P.** Protests

1. Any bidder who submitted a bid and believes the bid was improperly rejected or that the bid selected by the Owner is not in the best interest of the Owner may submit a written notice of intent to protest the bid to the Owner within seven (7) days. The Owner shall consider all protests before execution of a contract. Each protest must specify the reasons supporting the protest. The Owner may require that additional information be provided. Failure to supply such required information shall be cause for dismissal of the protest.

2. The Owner shall immediately investigate the allegations against the Owners actions and shall issue a written response to the protest.

3. This provision allowing for the submission of protest shall not confer any right on any bidder but is intended solely to assist the Owner in determining the best responsible bid.

**Q.** Any complaint or protest of the bidding procedure must be filed by the bidder to the Owner. Within 7 days of bid opening the bidder shall notify the Owner in writing of his intent to protest bidding. The bidder shall perfect this notice of intent within 7 days.

**R.** Owner reserves right to disqualify bids and bidders, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon part of bidder, lack of responsibility as evidenced by poor workmanship and progress of past work, incomplete work which, in judgment of Owner, might hinder or prevent prompt completion of additional work if awarded, for being in arrears on existing contracts, in litigation with the Owner, or having defaulted on a previous contract.

**S.** Bidder's attention is directed to the fact that all Federal and Illinois State Laws, municipal ordinances and regulations of any and all authority having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full. Successful Bidders shall be required to comply with 775 ILCS 10 concerning equal employment opportunities; comply with 30 ILCS 570 concerning the employment of citizens of the State of Illinois; comply with 820 ILCS 265 concerning substance abuse prevention on public works projects; and comply with 820 ILCS 130 concerning prevailing wages.
T. Owner is exempt from payment of Federal & Illinois Department of Revenue's Use and Sales Tax on material entering permanently into structure. Retail sales tax shall not be included in the bid amount.

U. Bids will be opened as announced in Invitation for Bids.

V. Owner reserves the right to reject any or all bids or any part thereof, to waive any informalities in bidding and to accept bids deemed most favorable to the Owner.

W. Notwithstanding any delay in preparation and execution of the formal Contract Agreement, each bidder shall be prepared, upon written notice of bid acceptance, to commence work within ten (10) days following receipt of official written Notice to Proceed, or on date stipulated in such notice.

X. Any work in providing or preparing to provide the services specified herein that is commenced by the successful bidder prior to execution of a written contract agreement shall be at the bidder’s expense.

Y. Accepted bidder shall assist and cooperate with the Owner in preparing the formal Contract Agreement, and, within seven (7) days following its presentation, shall execute same and return it to Owner.

Z. Contract Time: Time of Substantial Completion for the project shall not be later than August 7, 2020.

1.5 REQUIRED CONTRACTOR/SUBCONTRACTOR BACKGROUND SCREENING

A. Cahokia USD #187 requires background screening to be completed on all contractor/subcontractor employees. All employees must have documentation that a background screening has been completed on them prior to working on any district projects. All costs associated with the background screening are to be the responsibility of the contractor. The background screening must be conducted by a company acceptable to the Cahokia USD #187.

B. All contractor/subcontractor employees working on the school grounds of Cahokia USD #187 are required to submit to Background Screening. Each employee must complete, sign, and date the Consent and Waiver Release form. These forms will be submitted and the applicant cleared before the applicant may work on any part of the school grounds.

C. The Contractor is responsible for submitting the forms to a company acceptable to the Cahokia USD #187, and for any costs involved in the screening. All information received as a result of a background check will be strictly confidential. A notice of automatic disqualification will be sent to the hiring or using entity. After the screenings, the Contractor is also responsible for sending Cahokia USD #187 copies of approved background checks for their records.

END OF DOCUMENT
REQUEST FOR INTERPRETATION PRE-BID QUESTION AND COMMENT FORM

(All information entered shall be typed in black).

PROJECT NAME: Summer 2020 H/LS Improvements, Cahokia USD #187

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<thead>
<tr>
<th>BIDDER:</th>
<th>SUBMITTED BY (Name):</th>
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<td>ADDRESS:</td>
<td>CITY:</td>
<td>STATE:</td>
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<tr>
<th>Question No.</th>
<th>Page (or Drawing Sheet) Number</th>
<th>Drawing No. or Spec. Section Article &amp; Paragraph Number</th>
<th>Question by Bidder</th>
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NOTE: ANY AND ALL QUESTIONS PERTAINING TO THIS BID MUST BE TYPED AND SUBMITTED ON THIS FORM AND MAILED OR E-MAILED TO RECEIVE A RESPONSE.

END OF SECTION 00 21 14.
To: CAHOKIA USD #187
1700 JEROME LANE
CAHOKIA, ILLINOIS 62206

Project: SUMMER 2020 H/LS IMPROVEMENTS
CAHOKIA USD #187
CAHOKIA, ST. CLAIR COUNTY, ILLINOIS
HR# 150-2229

Date: ________________________________

Submitted by: ________________________________
(full name)
(full address)

Contact Name: ________________________________

1. OFFER

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Hurst-Rosche, Inc. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of the following:

**Bid Package A - Wirth Middle School:**

$ ________________________________ dollars, in lawful money of the United States of America.

**Bid Package B - Lalumier Elementary School:**

$ ________________________________ dollars, in lawful money of the United States of America.

**Bid Package C - Penniman, Elizabeth Morris and Maplewood Elementary Schools:**

$ ________________________________ dollars, in lawful money of the United States of America.

**Bid Package D - Huffman Elementary School:**

$ ________________________________ dollars, in lawful money of the United States of America.

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

All applicable federal taxes are excluded and State of Illinois and City of Cahokia taxes are excluded from the Bid Sum.
All Cash and Contingency Allowances described in Section 01 20 00 - Price and Payment Procedures are included in the Bid Sum.

2. REVIEW OF BID DOCUMENTS

The bidder represents that he is skilled and experienced in the use and interpretation of drawings and specifications such as those included in the bid documents for this contract. He has carefully reviewed the drawings, specifications and other bid documents, and has found them free of ambiguities and sufficient for bid purposes. Further, the Bidder has carefully examined the site of the work and, from his own observations, has satisfied himself as to the nature and location of the work; the character, quality and quantity of materials; the difficulties likely to be encountered; and any other items which may affect the performance of the Work. He has based his bid solely on these documents and observations, and has not relied in any way on any explanation or interpretation, oral or written, from any other source.

3. CONTRACTOR’S FEE FOR CHANGES IN WORK

Undersigned herein indicates a single percentage, not to exceed 12% for own forces and not to exceed 8% for subcontractors, for overhead and profit to be added to net extra job cost for changes in the work required to be performed by:

a) Own Forces ____%  
b) Subcontractors ____%

Undersigned herein indicates a single percentage, not less than 10% for own forces and not less than 5% for subcontractors, for overhead and profit to be added to net credit for job costs for changes in the work required to be performed by:

a) Own Forces ____%  
b) Subcontractors ____%

Percentages named above shall not include any items of insurance, bond or taxes since these are considered job cost items in contractor’s quotations for changes in the work.

Any percentages indicated which are higher or lower than the maximum or minimum in the typewritten language herewith, shall be disregarded and typewritten figure used.

4. CONTRACT TIME

Undersigned agrees that, if awarded the Contract for Work bid upon herein, work will start on date designated in a written Notice to Proceed order issued by the Architect and will be completed in accordance with the contract documents, with all phases of work completed and operational and ready for acceptance by the Owner no later than as required by the Contract Agreement.

5. ADDENDA

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.

Bid Package A:
Addendum # _______ Dated _______ ; Addendum # _______ Dated _______ 
Addendum # _______ Dated _______ ; Addendum # _______ Dated _______
Bid Package B:
Addendum # Dated ; Addendum # Dated
Addendum # Dated ; Addendum # Dated
Addendum # Dated ; Addendum # Dated

Bid Package C:
Addendum # Dated ; Addendum # Dated
Addendum # Dated ; Addendum # Dated

Bid Package D:
Addendum # Dated ; Addendum # Dated
Addendum # Dated ; Addendum # Dated

6. APPENDICES

The following documents are attached to and made a condition of the Bid:

Bid Bond
Bidder’s qualifications statement and supporting data.
Document 00 43 00 - Procurement Form Supplements including:
Appendix A - List of Subcontractors.
Appendix B - List of Alternates.

7. EQUAL EMPLOYMENT OPPORTUNITY

During performance of this contract, Contractor agrees as follows:

a. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

b. The contractor will in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

c. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract of understanding, notice advising the labor union or worker's representative of the contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and by the rules, regulations, and relevant orders of the Secretary of Labor.

e. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and order of the Secretary of Labor.
Labor pursuant thereto, and will permit access to his books, records and accounts by the Department of the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

f. In the event of the contractor's non-compliance with the nondiscrimination clauses of this contract or with any such rules, regulations or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies involved as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

g. The contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the Department may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with the subcontractor or vendor as a result of such direction by the Department, the contractor may request the United States to enter into such litigation to protect the interest of the United States.

8. NOT BARRED

The contractor by submitting its bid certifies that the Contractor is not barred from bidding on the contract as a result of a conviction for either bid-rigging or bid-rotating. 720 ILCS 5/33/E-11.

9. DRUG FREE WORKPLACE

The Contractor by submitting its bid certifies that it will provide a drug free workplace and that it is in compliance with the requirements of the Drug Free Workplace Act 30 ILCS 580.1 et. seq., and the Substance Abuse Prevention on Public Works Projects Act PA095-0635.

10. SEXUAL HARASSMENT POLICY

The Contractor by submitting its bid certifies that it has a written sexual harassment, (ii) a description of sexual harassment, utilizing examples; (iv) an internal complaint process including penalties (v) the legal resource, investigative and compliant process through the Illinois Department of Human Rights; (vi) directions on how to contact the Department and Commission; and (vii) protection against retaliation for exercising rights under the policy in accordance with 775 ILCS 5/2-105(A)(4).

11. CRIMINAL RECORDS CHECKS

The Contractor by submitting its bid certifies that it will submit to background screening those employees, including subcontract employees, which will be working on any district project. This information is to be provided in accordance with the requirements of 105 ILCS 5/10-21.9. The Contractor by submitting its bid understands that employees found to be in violation of the Illinois School Code will not be permitted to work on school grounds.
12. BID FORM SIGNATURES

The Corporate Seal of

______________________________
(Bidder - print the full name of your firm)
was hereunto affixed in the presence of:

______________________________
(Authorized signing officer       Title)

(Seal)

______________________________
(Authorized signing officer       Title)

(Seal)

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 DOCUMENT
DOCUMENT 00 43 00 - PROCUREMENT FORM SUPPLEMENTS

To: CAHOKIA USD #187
1700 JEROME LANE
CAHOKIA, ILLINOIS 62206

Project: SUMMER 2020 H/LS IMPROVEMENTS
CAHOKIA USD #187
CAHOKIA, ST. CLAIR COUNTY, ILLINOIS
HR# 150-2229

Date: ______________________________

Submitted by: ______________________________
(full name)

(full address)

Contact Name: ______________________________

In accordance with Document 00 21 14 - Instructions to Bidders - AIA and Document 00 41 13 - Bid Form - Stipulated Sum, we include the Appendices to Bid Form Supplements listed below. The information provided shall be considered an integral part of the Bid Form.

The following Appendices are attached to this document:

Appendix A - List of Subcontractors: Include names of all Subcontractors and portions of the Work each Subcontractor will perform.

Appendix B - List of Alternates: Include cost variation to Bid Sum applicable to the Work described in Section 01 20 00-Price and Payment Procedures.

BID FORM SUPPLEMENTS SIGNATURES

The Corporate Seal of

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

(Authorized signing officer Title)
(Seal)

(Authorized signing officer Title)
(Seal)
APPENDIX A - LIST OF SUBCONTRACTORS

Herewith is the list of subcontractors referenced in the bid submitted by:

(Bidder) __________________________

To (Owner) CAHOKIA USD #187

Dated _____________ and which is an integral part of the Bid Form.

The following work will be performed (or provided) by subcontractors and coordinated by us:

<table>
<thead>
<tr>
<th>WORK SUBJECT</th>
<th>NAME</th>
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<tbody>
<tr>
<td>Mechanical</td>
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<td>Tiling / Carpeting</td>
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<td>Quartz Epoxy Flooring</td>
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<td>Wall / Ceilings</td>
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<td>Doors / Hardware</td>
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<td>Asbestos</td>
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APPENDIX B – LIST OF ALTERNATES

The following is the list of alternates referenced in the bid submitted by:

(Bidder) ______________________________________

To (Owner) CAHOKIA USD #187

Dated _____________________ and which is an integral part of the Bid Form.

The following amounts shall be added to or deducted from the Bid Sum. Refer to Section 01 20 00 – Price and Payment Procedures: Schedule of Alternates for description of alternates:

Bid Package A Alternate #1 (Add/Deduct) $ ________________

Bid Package A Alternate #2 (Add/Deduct) $ ________________

Bid Package B Alternate #1 (Add/Deduct) $ ________________

Bid Package C Alternate #1 (Add/Deduct) $ ________________

Bid Package D Alternate #1 (Add/Deduct) $ ________________

END OF DOCUMENT
DOCUMENT 00 52 14 - AGREEMENT FORM - AIA

1.1 SUMMARY

A. Document Includes:
   1. Contract Agreement.

B. Related Documents:
   1. Document 00 72 14 - General Conditions – AIA Stipulated Sum.
   2. Document 00 73 13 - Supplementary Conditions - AIA.

1.2 CONTRACT AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. THIS AGREEMENT, made and entered into as of the _______ day of ___________
   in the year of Two Thousand and ________ by and between ______________________
   hereinafter and in the Contract Documents called "Contractor" and the CAHOKIA USD
   #187, hereinafter and in the Contract Documents called "Owner."

B. WITNESSETH: That for and in consideration of the mutual covenants and agreements,
   hereinafter stated, Contractor and Owner covenant and agree as follows:

C. THE CONTRACT WORK:

1. Contractor covenants and agrees to furnish all labor, materials, equipment,
   transportation, construction plant and facilities necessary to perform all Work
   required by the Contract Documents, for the Project entitled:

   a. Summer 2020 H/LS Improvements
      Cahokia USD #187
      Cahokia, St. Clair County, Illinois
      HR# 150-2229

   as shown on Drawings and described in Specifications prepared by Hurst-
   Rosche, Inc., Hillsboro, Illinois, acting as, and in these Contract Documents
   referred to as Architect/Engineer and covenants and agrees to do and perform all
   acts and things required of Contractor by this Contract and the Contract
   Documents.

D. TIME OF COMPLETION:

1. The Owner requires the project to be substantially complete by August 7, 2020.
   Should the Contractor fail to complete the Work within such time, contractor
   agrees to compensate and will apply to the Owner for each and every day of such
   delay in completion of the Work beyond the Contract Time the sum of Five
   Hundred Dollars ($500.00) per day for Work not completed by the substantial
   completion date as liquidated damages.
E. CONTRACT SUM AND TERMS OF PAYMENT:

1. Contract Sum: The Owner, if Contractor shall faithfully fulfill and perform this Contract, covenants and agrees to pay Contractor in current funds, subject to additions and deductions by Change Order as provided in the Contract Documents, the sum of ______________________ Dollars ($_____), which sum shall constitute the Contract Sum, said Contract Sum being derived from Contractor's Bid dated ______________________. It is understood and agreed that should there be any increase in wage rates, or in cost of materials or equipment, or in any other of Contractor's costs or should Contractor be compelled to pay premium wages, or for overtime work, during the life of this Contract and/or prior to completion of Contractor's work thereunder, Contractor shall absorb all such increased costs, without addition to the Contract Sum except when otherwise expressly provided in Contract Documents.

2. Payments: Owner shall make payments for work performed under the Contract as provided in Article Nine of the General Conditions and in accordance with other applicable articles of the Supplementary Conditions and Contract Documents.

3. Contractor's Fees for Changes in Work: In accordance with Contractor's bid, it is agreed that the following percentages for overhead and profit shall be applied on work added to or omitted from the Contract by written Change Order approved by Architect and Owner in advance of performance of the work.

   Additional Work performed by:
   1. Own Forces ___%  2. Subcontractors ___%

   Omitted Work originally required by:
   1. Own Forces ___%  2. Subcontractors ___%

   Note: Taxes (when applicable) are considered as incidentals, as well as bonds and insurance costs and are not included in the percentages listed above nor should they be added to change orders submitted.

F. CONTRACT DOCUMENTS:

1. Contract Documents include the Contract Agreement, Contractor's Bid as accepted by Owner, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract Agreement.

2. Bidder’s attention is directed to the fact that all Federal and Illinois State Laws, municipal ordinances and regulations of any and all authority having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written
out in full. Successful Bidders shall be required to comply with 777 ILCS 10 concerning equal employment opportunities; comply with 30 ILCS 570 concerning the employment of citizens of the State of Illinois; comply with 820 ILCS 265 concerning substance abuse prevention on public works projects; and comply with 820 ILCS 130 concerning prevailing wages.

G. ILLINOIS LABOR:

Contractor shall comply with all Illinois statutory requirements regarding labor, including, but not limited to, the following:

1. Illinois Public Act 77-1552 and Chapter 48, Sections 39S-1 through 39S-12 of the Illinois Revised Statutes regulating wages of laborers, mechanics and other workers employed in any public works and known as the "Prevailing Wage Act," which provides in part that all laborers, mechanics and workers performing work under the Contract shall be paid not less than the prevailing rate of wages as determined by the Illinois Department of Labor (820 ILCS 130).

2. Illinois Public Act 83-1472, Article 2 and Chapter 48, Sections 2201 through 2207, 1984 of the Illinois Revised Statutes pertaining to hiring of Illinois labor and known as the "Illinois Preference Act (30 ILCS 570)."


H. PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND:

1. Within ten (10) days immediately following date of his receipt of this contract, Contractor shall furnish Owner the signed Contract and Performance Bond and Labor and Material Payment Bond as required by and in accordance with the terms of Contract Documents in a penal sum of one hundred percent (100%) of the Contract sum.

2. In the event Contractor fails to furnish Owner such Contract and Bonds within said period, this Contract shall thereupon become null and void at Owner's option, exercised by written registered notice and mailed to Contractor by said Owner within five (5) days thereafter. Owner may then retain and enforce as liquidated damages, bid guarantee heretofore deposited with it in connection with Contractor's proposal for this Contract or the difference between his bid and a subsequent awarded bid, whichever is lesser.
I. IN WITNESS HEREOF, the parties hereto have executed this agreement as of the day and year first written above.

OWNER:

CAHOKIA USD #187

BY__________________________

TITLE______ Arnett Harvey, Superintendent

CONTRACTOR:

Attest:

________________________________

BY__________________________

Secretary

BY__________________________

TITLE________________________

END OF DOCUMENT
PROJECT LABOR AGREEMENT

As adopted on November 10, 2004 by the Southwestern Illinois Building & Construction Trades Council Board of Business Agents

This Agreement is entered into this day of 2004 by and between and the Southwestern Illinois Building Trades Council (SIBTC) for and on behalf of its affiliates which sign a "Union Letter of Assent" (Signatory Union Affiliates) for this Project Labor Agreement, hereinafter referred to as the "Union." This Agreement shall apply to work performed by the Employer and its Contractors and Subcontractors on Construction known as the ________________

ARTICLE I - INTENT AND PURPOSES

1.1 This Project Agreement shall apply and is limited to the recognized and accepted historical definition of new construction work under the direction of and performed by the Contractor(s), of whatever tier, which may include the Project Contractor, who have contracts awarded for such work on the Project. Such work shall include site preparation work and dedicated off-site work.

The Project is defined as: __________________________________________

1.2 It is agreed that the Project Contractor shall require all Contractors of whatever tier who have been awarded contracts for work covered by this Agreement, to accept and be bound by the terms and conditions of this Project Agreement by executing the Letter of Assent (Attachment A) prior to commencing work. The Project Contractor shall assure compliance with this Agreement by the Contractors. It is further agreed that the terms and conditions of this Project Agreement shall supersede and override terms and conditions of any and all other national, area, or local collective bargaining agreements, (including all vertical agreements), except for all work performed under the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, and the National Agreement of the International Union of Elevator Constructors.

1.3 The Contractor agrees to be bound by the terms of the Collective Bargaining Agreements and amendments thereto of the Signatory Union Affiliates and the applicable employers association, if any, with the Signatory Union Affiliates with which it has a present bargaining relationship. If there has previously been no such bargaining relationship, the contractor or subcontractor shall sign and be bound to all such agreements with Signatory Union Affiliates as outlined in the scope of work in the required pre-job conference. Such agreements are incorporated herein by reference. In order to comply with the requirements of the various fringe benefit funds to which the Contractor is to contribute, the Contractor shall sign such participation agreements as are necessary and will honor the fringe benefit collection procedures as required by the Collective Bargaining Agreement with the Signatory Union Affiliate.
1.4 The Contractor and the Union agree that should the Collective Bargaining Agreement (CBA) of any Signatory Union Affiliate expire prior to the completion of this project, the expired contracts' terms will be maintained until a new CBA is ratified. The wages, and fringe benefits included in any new CBA will be effective on the effective date of the newly negotiated CBA unless wage and fringe benefit retroactivity is agreed upon by the bargaining parties.

1.5 Nothing contained herein shall be construed to prohibit, restrict or interfere with the performance of any other operation work, or function which may occur at the Project site or be associated with the development of the Project.

1.6 This Agreement shall only be binding on the signatory parties hereto and shall not apply to their parents, affiliates, subsidiaries, or Non-Signatory Union Affiliates.

1.7 The Owner and/or the Project Contractor have the absolute right to select any qualified bidder for the award of contracts on this Project without reference to the existence or nonexistence of any agreements between such bidder and any party to this Agreement; provided, however, only that such bidder is willing, ready and able to become a party to and comply with this Project Agreement, should it be designated the successful bidder.

1.8 Items specifically excluded from the scope of this Agreement include but are not limited to the following: [list all items to be excluded].

1.9 The provisions of this Project Agreement shall not apply to ______________________ (Owner), and nothing contained herein shall be construed to prohibit or restrict ______________________ (Owner) or its employees from performing work not covered by this Project Agreement on the Project site. As areas and systems of the Project are inspected and construction tested by the Project Contractor or Contractors and accepted by the Owner, the Project Agreement will not have further force or effect on such items or areas, except when the Project Contractor or Contractors are directed by the Owner to engage in repairs, modifications, check-out, and warranty functions required by its contract with the Owner during the term of this Agreement.

1.10 It is understood that the Owner, at its sole option, may terminate, delay and/or suspend any or all portions of the Project at any time.

1.11 It is understood that the liability of any employer and the liability of a Signatory Union Affiliate and the SIBTC under this Agreement shall be several and not joint. Provided that the SIBTC or a Signatory Union Affiliate comply with their own obligations under this Agreement, the SIBTC and non-breaching Signatory Union Affiliates will not be liable for a breach of this Agreement by a breaching Signatory Union Affiliate or any action taken by a Non-Signatory Union Affiliate. The Union agrees that this Agreement does not have the effect of creating any joint employer status between or among the Owner, Contractor(s) or any employer.

1.12 Each affiliate union of the SIBTC representing employees engaged in construction work covered by this Agreement shall be requested to sign the "Union Letter of Assent", in the form attached hereto; provided, that the failure of any affiliate union to sign such Union Letter of Assent prior to commencement of construction work shall not diminish the applicability of this Agreement to the SIBTC and the union affiliates which have signed a Union Letter of Assent. Affiliates unions that have signed the Union Letter of Assent will be referred to as "Signatory Union Affiliates" and

SIBTC PROJECT LABOR AGREEMENT
(Adopted 11/10/2004)
affiliate unions that have not signed the Union Letter of Assent will be referred to as "Non-Signatory Union Affiliates."

ARTICLE II - RECOGNITION

2.1 The Contractor recognizes the SIBTC and the Signatory Union Affiliates as the sole and exclusive bargaining representatives for its craft employees employed on the job site. Signatory Union Affiliates will have recognition on the project for their craft.

ARTICLE III - ADMINISTRATION OF AGREEMENT

3.1 In order to assure that all parties have a clear understanding of the Agreement, to promote harmony and address potential problems, a pre-job conference will be held with the Contractor, SIBTC Representatives and all signatory parties prior to the start of any work on the project.

3.2 Representatives of the Contractor and the Union shall meet as required but not less than once a month to review the operation of this Agreement. The representatives at this meeting shall be empowered to resolve any dispute over the intent and application of the Agreement.

3.3 The Contractor shall make available in writing to the Union no less than one week prior to these meetings a job status report, planned activities for the next 30 day period, actual numbers of craft employees on the project and estimated numbers of employees by craft required for the next 30 day period. The purpose of this report is to allow time to address any potential jurisdictional problems and to ensure that no party signatory to the Agreement is hindering the continuous progress of the project through a lack of planning or shortage of manpower.

ARTICLE IV - HOURS OF WORK OVERTIME SHIFTS & HOLIDAYS

4.1 The standard work day shall be an established consecutive eight (8) hour period between the hours of 7:00 a.m. and 5:00 p.m. with one-half hour designated as unpaid period for lunch. The standard work week shall be five (5) consecutive days of work commencing on Monday. Starting time which is to be established at the pre-job conference will be applicable to all craft employees on the project. Should job conditions dictate a change in the established starting time and/or a staggered lunch period on certain work of the project or with individual crafts, the Contractor, Business Managers of the Signatory Union Affiliates involved and the SIBTC shall mutually agree to such changes. If work schedule change cannot be mutually agreed to between these parties, the hours fixed in the Agreement shall prevail.

4.2 All time before and after the established work day of eight (8) hours, Monday through Friday and all time on Saturday shall be paid in accordance with each crafts current collective bargaining agreement. All time on Sundays and Holidays shall be paid for at the rate of double time.

(a) Fringe benefit payments for all overtime work shall be paid in accordance with each Signatory Union Affiliate’s current Collective Bargaining Agreement.
4.3 Shift work, if used, shall be as provided in the collective bargaining agreement of each affected Signatory Union Affiliate.

4.4 Recognized Holidays shall be as follows: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veterans Day (to be celebrated on November 11), Thanksgiving Day and Christmas Day. No work will be performed on Labor Day under any consideration, except in an extreme emergency and then only after consent is given by the Business Manager of the Signatory Union Affiliates.

ARTICLE V - ABSENTEEISM

5.1 The Contractor and the Union agree that chronic and/or unexcused absenteeism is undesirable and must be controlled. Employees that develop a record of such absenteeism shall be identified by the Contractor to the appropriate referral facility and the Contractor shall support such action with the work record of the involved employee. Any employee terminated for such absenteeism shall not be eligible for rehire on the project for a period of no less than ninety (90) days.

ARTICLE VI - MANAGEMENT RIGHTS

6.1 The Contractor retains and shall exercise full and exclusive authority and responsibility for the management of its operations, except as expressly limited by the terms of this Agreement and the collective bargaining agreements of the Signatory Union Affiliates.

ARTICLE VII - GENERAL WORKING CONDITIONS

7.1 Employment begins and ends at the project site, to be determined at the Pre-Job Conference.

7.2 Employees shall be at their place of work at the starting time and shall remain at their place of work until quitting time. The parties reaffirm their policy of a fair day's work for a fair day's pay.

7.3 The Contractor may utilize brassing, or other systems to check employees in and out. Should such procedures be required, the techniques and rules regarding such procedures shall be established by mutual consent of the parties at the pre-job conference.

7.4 There shall be no limit on production by workmen nor restrictions on the full use of tools or equipment. Craftsmen using tools shall perform any work of their trade and shall work under the direction of the craft foreman. There shall be no restrictions on efficient use of manpower other than as may be required by safety regulations.

7.5 Crew Foreman shall be utilized as per the existing collective bargaining agreements. The Contractor agrees to allow crew foremen ample time to direct and supervise their crew. The Union agrees there will be no restrictions placed on crew foreman's ability to handle tools and materials.

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(Accepted 11/10/2004)
7.6 The Contractor may utilize the most efficient methods or techniques of construction, tools or other labor saving devices to accomplish the work. Practices not a part of the terms and conditions of this Agreement will not be recognized.

7.7 Should overtime work be required, the Contractor will have the right to assign specific employees and/or crews to perform such overtime work as is necessary to accomplish the work.

7.8 The Contractor may establish such reasonable project rules as the Contractor deems appropriate. These rules will be reviewed and established at the pre-job conference and posted at the project site by the Contractor.

7.9 It is recognized that specialized or unusual equipment may be installed on the project and in such cases, the Union recognizes the right of the Contractor to involve the equipment supplier or vendor's personnel in supervising the setting of the equipment, making modifications and final alignment which may be necessary prior to and during the start-up procedure, in order to protect factory warranties.

7.10 In order to promote a harmonious relationship between the equipment or vendor's personnel and the Building Trades craftsmen, a meeting shall be held between the Contractor and the Unions prior to any involvement on the project by these personnel. The Contractor will inform the Union of the nature of involvement by these personnel and the numbers of personnel to be involved, allowing ample time for the Union representatives to inform their stewards prior to the start of any work.

ARTICLE VIII - SAFETY

8.1 The employees covered the terms of this Agreement shall at all times while in the employ of the Contractor be bound by the safety rules and regulations as established by the Contractor in accordance with the Construction Safety Act and OSHA.

a. These rules and regulations will be published and posted at conspicuous places throughout the project.

8.2 In accordance with the requirements of OSHA, it shall be the exclusive responsibility of each Contractor on a jobsite to which this Agreement applies, to assure safe working conditions for its employees and compliance by them with any safety rules contained herein or established by the Contractor. Nothing in this Agreement will make the SIBTC or any of its affiliates liable to any employees or to other persons in the event that injury or accident occurs.

ARTICLE IX - SUBCONTRACTING

9.1 The Project Contractor agrees that neither it nor any of its contractors or subcontractors will subcontract any work to be done on the Project except to a person, firm or corporation who is or agrees to become party to this Agreement. Any contractor or subcontractor working on the Project shall, as a condition to working on said Project, become signatory to and perform all work under the terms of this Agreement.
ARTICLE X - UNION REPRESENTATION

10.1 Authorized representatives of the SIBTC and its Signatory Union Affiliates shall have access to the project provided they do not interfere with the work of the employees and further provided that such representatives fully comply with the visitor and security rules established for the project.

10.2 Each Signatory Union Affiliate shall have the right to designate a working journeyman as a steward. Such designated steward shall be a qualified worker performing the work of that craft and shall not exercise any supervisory functions. Each steward shall be concerned with the employees of the steward's employer and not with the employees of any other employer.

10.3 The working steward will be paid at the applicable wage rate for the job classification in which he is employed.

10.4 The working steward shall not be discriminated against because of his activities in performing his duties as steward, and except as otherwise provided in local agreements, shall be the last employee in his craft to be laid off in any reduction in force. Stewards will be subject to discharge to the same extent that other employees are only after notification to the Union Representative. The Contractor will permit stewards sufficient time to perform the duties inherent to a steward's responsibilities. Stewards will be offered available overtime work if qualified.

ARTICLE XI - DISPUTES AND GRIEVANCES

11.1 This Agreement is intended to provide close cooperation between management and labor. Each of the Signatory Union Affiliates will assign a representative to this Project for the purpose of completing the construction of the Project economically, efficiently, continuously, and without interruptions, delays, or work stoppages.

11.2 The Contractor, the Union, and the employees, collectively and individually, realize the importance to all parties to maintain continuous and uninterrupted performance of the work of the Project, and agree to resolve disputes in accordance with the grievance arbitration provisions set forth in this Article.

11.3 Any question or dispute arising out of and during the term of this Project Agreement (other than trade jurisdictional disputes) shall be considered a grievance and subject to resolution under the following procedures:

Step 1. (a) When any employee subject to the provisions of this Agreement feels he or she is aggrieved by a violation of this Agreement, he or she, through his or her local union business representative or job steward, shall, within five (5) working days after the occurrence of the violation, give notice to the work-site representative of the involved Contractor stating the provision(s) alleged to have been violated. The business representative of the local union or the job steward and the work-site representative of the involved Contractor and the Project Contractor shall meet and endeavor to adjust the matter within three (3) working days after timely notice has been given. The representative of the Contractor shall keep the meeting minutes and shall respond to the Union representative in writing (copying the Project Contractor) at the conclusion of the meeting but not later than twenty-four (24) hours thereafter. If they fail to resolve the matter within
the prescribed period, the grieving party may, within forty-eight (48) hours thereafter, pursue Step 2 of the Grievance Procedure, provided the grievance is reduced to writing, setting forth the relevant information concerning the alleged grievance, including a short description thereof, the date on which the grievance occurred, and the provision(s) of the Agreement alleged to have been violated.

(b) Should the Local Union(s) or the Project Contractor or any Contractor have a dispute with the other party and, if after conferring, a settlement is not reached within three (3) working days, the dispute may be reduced to writing and proceed to Step 2 in the same manner as outlined herein for the adjustment of an employee complaint.

Step 2. The International Union Representative and the involved Contractor shall meet within seven (7) working days of the referral of a dispute to this second step to arrive at a satisfactory settlement thereof. Meeting minutes shall be kept by the Contractor. If the parties fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within seven (7) calendar days thereafter.

Step 3. (a) If the grievance has been submitted but not adjusted under Step 2, either party may request in writing, within seven (7) calendar days thereafter, that the grievance be submitted to an Arbitrator mutually agreed upon by them. The Contractor and the involved Union shall attempt mutually to select an arbitrator, but if they are unable to do so, they shall request the American Arbitration Association to provide them with a list of arbitrators from which the Arbitrator shall be selected. The rules of the American Arbitration Association shall govern the conduct of the arbitration hearing. The decision of the Arbitrator shall be formal and binding on all parties. The fee and expenses of such Arbitration shall be borne equally by the Contractor and the involved Local Union(s).

(b) Failure of the grieving party to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the parties involved at the particular step where the extension is agreed upon. The Arbitrator shall have the authority to make decisions only on issues presented to him or her, and he or she shall not have authority to change, amend, add to or detract from any of the provisions of this Agreement.

11.4 The Project Contractor and Owner shall be notified of all action at Steps 2 and 3 and shall, upon their request, be permitted to participate in all proceedings at these steps.

ARTICLE XII - JURISDICTIONAL DISPUTES

12.1 The assignment of work will be solely the responsibility of the Contractor performing the work involved, in accordance with applicable Collective Bargaining Agreements and past practices. To the extent that past practice is a factor in assigning work under the Project Labor Agreement, including assignments under any collective bargaining agreements to which any of the signatory contractors hereto may be a party, the practice to be applied shall be that followed within the geographical area encompassed by the Southwestern Illinois Building and Construction Trades Council. The practice followed in any other geographical area, even though a Union signatory to this Project Labor Agreement may also represent employees in that area, shall not be a factor in the assignment. All jurisdictional disputes between or among Building and Construction Trades

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(Adopted 11/10/2006)
Unions and employees and the Contractor, parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be adopted in the future by the Building and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractor and Union parties to this Agreement.

12.2 All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Contractor's assignment shall be adhered to until the dispute is resolved. Individuals violating this section shall be subject to immediate discharge.

12.3 Each Contractor will conduct a pre-job conference with the appropriate Building and Construction Trades Council prior to commencing work. The Project Contractor and the Owner will be advised in advance of all such conferences and may participate if they wish.

ARTICLE XIII - WORK STOPPAGES AND LOCKOUTS

13.1 During the term of this Agreement there shall be no strikes, picketing, work stoppages, slow downs or other disruptive activity for any reason by the SIBTC, its Signatory Union Affiliates or by any employee and there shall be no lockout by the Contractor. Failure of any Signatory Union Affiliate or employee to cross any picket line established at the project site is a violation of this Article.

13.2 The SIBTC and its Signatory Union Affiliates shall not sanction, aid or abet, encourage or continue any work stoppage, picketing or other disruptive activity and will not make any attempt of any kind to dissuade others from making deliveries to or performing services for or otherwise doing business with the Contractor at the project site. Should any of these prohibited activities occur the SIBTC and the Signatory Union Affiliates will take the necessary action to end such prohibited activities.

13.3 No employee shall engage in any activities which violate this Article. Any employee who participates in or encourages any activities which interfere with the normal operation of the project shall be subject to disciplinary action, including discharge, and if justifiably discharged for the above reasons, shall not be eligible for rehire on the same project for a period of not less than ninety (90) days.

13.4 Neither the SIBTC nor its Signatory Union Affiliates, will be liable for acts of employees for whom it has no responsibility. The principal officer or officers of the SIBTC will immediately instruct, order and use the best efforts of his office to cause Signatory Union Affiliates to cease any violations of this Article. The SIBTC in its compliance with this obligation shall not be liable for unauthorized acts of Signatory Union Affiliates or Non-Signatory Union Affiliates. The principal officer or officers of any involved Signatory Union Affiliate will immediately instruct, order or use the best effort of his office to cause the employees the union represents to cease any violations of this Article. A union complying with this obligation shall not be liable for unauthorized acts of employees it represents. The failure of the Contractor to exercise its right in any instance shall not be deemed a waiver of its right in any other instance.

13.5 In lieu of any action at law or equity, any party shall institute the following procedure when a breach of this Article is alleged, after all involved parties have been notified of the fact.
a. The party invoking this procedure shall notify __________________ whom the parties agree shall be the permanent arbitrator under this procedure. In the event the permanent arbitrator is unavailable at any time, he shall appoint his alternate. Notice to the arbitrator shall be by the most expeditious means available, with notice by telegram or any effective written means to the party alleged to be in violation and all involved parties.

b. Upon receipt of said notice the arbitrator named above shall set and hold a hearing within twenty-four (24) hours if it is contended the violation still exists but not before twenty-four (24) hours after the telegraph notice to all parties involved as required above.

c. The Arbitrator shall notify the parties by telegram or any other effective written means, of the place and time he has chosen for this hearing. Said hearing shall be completed in one session. A failure of any party or parties to attend said hearing shall not delay the hearing of evidence or issuance of an Award by the Arbitrator.

d. The sole issue at the hearing shall be whether or not a violation of this Article has in fact occurred. The Award shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without an Opinion. If any party desires an Opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the Award. The Arbitrator may order cessation of the violation of this Article, and such Award shall be served on all parties by hand or registered mail upon issuance.

e. Such Award may be enforced by any court of competent jurisdiction upon the filing of the Agreement and all other relevant documents referred to herein above in the following manner. Telegraphic notice of the filing of such enforcement proceedings shall be given to the other party. In the proceeding to obtain a temporary order enforcing the Arbitrator's Award as issued under Section 13.5 of this Article, all parties waive the right to a hearing and agree that such proceedings may be exparte. Such agreement does not waive any party's right to participate in a hearing for a final order of enforcement. The Court's order or orders enforcing the Arbitrator's Award shall be served on all parties by hand or by delivery to their last known address or by registered mail.

f. Any rights created by statue or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance therewith are hereby waived by parties to whom they accrue.

g. The fees and expenses of the Arbitrator shall be borne by the party or parties found in violation, or in the event no violation is found, such fees and expenses shall be borne by the moving party.

h. If the Arbitrator determines in accordance with Section 13.5 that the SIBTC or a Signatory Union Affiliate has violated Article XIII, the SIBTC or the Signatory Union Affiliate shall, within eight (8) hours of receipt of this Award, direct all employees they
represent at the project to immediately return to work. If the employees do not return to work at the beginning of the next regularly scheduled shift following receipt of the Arbitrator's Award, and the SIBTC or Signatory Union Affiliate have not complied with Section 13.4 above, then the SIBTC or the Signatory Union Affiliate which has not complied with Section 13.4 shall pay the sum of ten thousand dollars ($10,000) as liquidated damages to the affected owner, and shall pay an additional ten thousand dollars ($10,000) per shift for each shift thereafter on which the employees have not returned to work. The Arbitrator shall retain jurisdiction to determine compliance with this Section and Section 13.4, and to assess liquidated damages.

ARTICLE XIV - GENERAL SAVINGS CLAUSE

14.1 If any Article or provision of this Agreement shall be declared invalid, inoperative or unenforceable by operation of law or by any of the above mentioned tribunals of competent jurisdiction, the remainder of this Agreement or the application of such Article or provision to persons or circumstances other than those as to which it has been held invalid, inoperative or unenforceable shall not be affected thereby.

ARTICLE XV - TERM OF AGREEMENT

15.1 This Agreement shall be in full force as of and from the date of the Notice of Award to the Final Acceptance of all applicable contractors.
IN WITNESS WHEREOF, the respective duly authorized representatives of the parties hereto have executed this Agreement on the date set forth opposite their respective signatures.

Date: ____________________________

(Contractor Representative)

(Firm's Name)

(Firm's Address)

__________

Date: ____________________________

Dale Stewart, Exec. Secretary - Treasurer
Southwestern Illinois Building &
Construction Trades Council
2A Meadow Heights Professional Park
Collinsville, IL 62234
ATTACHMENT A

CONTRACTOR LETTER OF ASSENT

All contractors of whatever tier (except those construction contractors who have directly signed the Agreement) shall execute the following Letter of Assent prior to commencing work:

(Contractor Letterhead)
(Name of Owner)
Office of Owner Representative
Attn: _________________________

RE: _________________________ Construction Project Agreement

Dear Sir:

Pursuant to Article I, Section 1.2, of the above reference Agreement, the undersigned contractor hereby agrees that it will be bound by and comply with all terms and conditions of said Project Labor Agreement, and any amendments thereto.

This Letter of Assent will remain in effect for the duration of the Agreement, and any extensions, after which this understanding will automatically terminate, except as provided for in Article I, Section 1.9, of the Agreement.

Sincerely,

(Name of Contractor of Subcontractor)

By: _________________________

Title: _________________________

SIBTC PROJECT LABOR AGREEMENT
(Adopted 11/10/2004)
Exhibit B – Union Letter of Assent (General)

(Effective Date)

To All Parties:

The Union signatory to this Union Letter of Assent hereby confirms that the undersigned Union agrees to be bound by the terms and conditions of any Project Labor Agreement established and entered into by the Executive Secretary Treasurer of the Southwestern Illinois Building and Construction Trades Council (SIBTC) after approval by the SIBTC Board of Business Agents on and after the Effective Date of this Union Letter of Assent, and that the Executive Secretary Treasurer of the SIBTC is authorized to enter into Project Labor Agreements on behalf of the signatory Union on and after the Effective Date.

This Union Letter of Assent may be terminated by providing 60 days advanced written notice to the Executive Secretary Treasurer of the SIBTC. In the event that the Union Letter of Assent is terminated, the Union will remain bound for the duration of any Project Labor Agreement with the SIBTC which was entered before the date of termination of this Union Letter of Assent.

(Authorized Union Representative)

(Local Union)

SIBTC PROJECT LABOR AGREEMENT
(Adopted 11/10/2004)
Exhibit B – Union Letter of Assent (Project Specific)

(Effective Date)

Name of Project: ________________________________

To All Parties:

The Union signatory to this Union Letter of Assent hereby confirms that the undersigned Union agrees to be bound by the terms and conditions of any Project Labor Agreement established and entered into by the Executive Secretary - Treasurer of the Southwestern Illinois Building and Construction Trades Council (SIBTC) on and after the Effective Date of this Union Letter of Assent for the Project, and that the Executive Secretary - Treasurer of the SIBTC is authorized to enter into a Project Labor Agreement on behalf of the signatory Union on and after the Effective Date for the Project.

This Union Letter of Assent may be terminated by providing 60 days advanced written notice to the Executive Secretary - Treasurer of the SIBTC. In the event that the Union Letter of Assent is terminated, the Union will remain bound for the duration of any Project Labor Agreement for the Project with the SIBTC which was entered before the date of termination of this Union Letter of Assent.

(Authorized Union Representative)

(Local Union)

SIBTC PROJECT LABOR AGREEMENT
(Adopted 11/10/2004)
INSTRUCTION TO BIDDERS

Award of Contract

The general contract will be awarded to the lowest responsible and eligible general bidder complying with the conditions and requirements provided in these instructions, the bid forms and the other bid documents. A "responsible" bidder is a bidder demonstrably possessing the skill, ability and integrity necessary to faithfully perform the work called for by the contract, based upon a determination of competent workmanship and financial soundness. An "eligible" bidder is a bidder who is not debarred from bidding under any applicable law, and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the project. In the interests of such harmony, the long-term supply of skilled manpower, and to provide a legally enforceable means of assuring labor stability and labor peace over the life of the project, each successful bidder and any and all levels of subcontractors, as a condition of being awarded a contract or subcontract, shall be required to enter into a Project Labor Agreement for the project known as: __________

located in the ____________________________ (Municipality)
with the Southwestern Illinois Building and Construction Trades Council, AFL-CIO, and its Signatory Affiliated Local Unions for the development and construction of the Project, and will be bound by the provisions of that agreement in the same manner as any other provision of the contract.

SIBTC PROJECT LABOR AGREEMENT
Rev. 11/12/2004
1.1 SUMMARY

A. Document Includes:
   1. General Conditions.

B. Related Documents:
   1. Document 00 52 14 – Agreement Form – AIA Stipulated Sum.
   2. Document 00 73 13 – Supplementary Conditions - AIA.

1.2 GENERAL CONDITIONS

A. AIA Document A201-2007, General Conditions of the Contract for Construction, is the
   General Conditions of the Contract.

1.3 SUPPLEMENTARY CONDITIONS

A. Refer to Document 00 73 13 for modifications to General Conditions.

END OF DOCUMENT
1.1 SUMMARY

A. Document Includes:
   1. General Conditions.
   2. Supplementary Conditions.

B. Related Documents:
   1. Document 00 41 13 – Bid Form – Stipulated Sum
   2. Document 00 52 14 – Agreement Form - AIA

1.2 GENERAL CONDITIONS

A. The General Conditions of the Contract for Construction, AIA Document A201, Sixteenth Edition, 2007, Articles 1 through 15, is a part of this Contract and is incorporated herein as fully as if here set forth. Copies of the General Conditions are on file and may be reviewed at the offices of the Architect, or may be obtained from the American Institute of Architects, St. Louis Chapter, 911 Washington St., #225, St. Louis, Missouri 63101-1203.

1.3 SUPPLEMENTARY CONDITIONS

A. The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction," AIA Document A201, Sixteenth Edition, 2007. Where any Article of the General Conditions is modified or changed or any Paragraph, Subparagraph or Clause thereof is modified, changed or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

1.4 REFERENCE TO DIVISION 01

A. Where provisions of General Conditions relate to project administrative or work-related requirements of the Contract, and those provisions differ from those specified in Division 01, provisions outlined in Division 01 shall prevail.

1.5 ARTICLE 1: GENERAL PROVISIONS

A. 1.5.1 In the second line following the word “Specifications” insert the words "and Project Manual,"

B. 1.6 TRANSMISSION OF DATA IN DIGITAL FORM: Add new subparagraph
   1.6.1:  
   1.6.1 Electronic drawings provided by the Owner or Architect are for informational purposes only and are not intended for any other use. The paper copies provided are a true representation of the completed design and if discrepancies should exist
between the paper copy and the electronic copy, the paper copy shall govern.

C. Delete Subparagraph 1.1.8 its entirety and substitute the following:

1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2. If the Initial Decision Maker is not specifically identified in the Agreement, the responsibilities of the Initial Decision Maker shall default to the Architect.

D. DEFINITIONS: Add Paragraph 1.1.9

1.1.9 PROJECT MANUAL

The Project Manual is the collection of documents which includes the bidding requirements, sample forms and, certain Contract Documents such as the Conditions of the Contract and the Specifications.

1.6 ARTICLE 2: OWNER

A. 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER:

B. Delete Subparagraphs 2.2.3 and 2.2.5 in their entireties and substitute the following:

2.2.3 The Owner shall, at the request of the Contractor, furnish to Contractor any survey or other similar descriptive information of project site that Owner has in his possession. Upon demonstration of need by Contractor for specific additional survey information, Owner shall obtain and furnish such information to Contractor.

2.2.5 Contractor will be furnished, free of charge, 4 copies of Drawings, Specifications, and Project Manual as set forth in Division 1 of the Specifications. Additional copies will be furnished to Contractor at cost of reproduction, postage and handling.

1.7 ARTICLE 3: CONTRACTOR

3.2. REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR: Add Subparagraphs 3.2.5 and 3.2.6:

3.2.5 The Contractor by executing the Contract represents that he has carefully examined the Site of the Work at each location and that he has full knowledge of and fully understands the facilities, site conditions, difficulties and restrictions attending performance of the Work. Contractor further represents that he has taken all required measurements and carefully inspected existing constructions, irregularities and interferences which may affect the Work. No additional compensation will be allowed for conditions increasing Contractor’s cost which were not known to or appreciated by him prior to executing the Contract if they
could have been discovered by him following the foregoing procedures and thoroughly informing himself of all existing conditions affecting the Work.

3.2.6 Contractor will not, however, be required to excavate, penetrate or demolish any constructions or other work and conditions prior to executing the Contract in order to uncover and/or expose concealed conditions that affect the Work. If, during course of construction, Contractor uncovers conditions that affect the work that could not have been known and understood by the above described careful examination of conditions affecting the Work, he shall promptly notify the Architect, in writing, who will determine if claims for additional costs or extensions of time are justified. If such claims are found to be justified, Contract will be modified in accordance with Article 7 of the General Conditions.

1.8 ARTICLE 4: ARCHITECT

A. 4.1 GENERAL: Delete Subparagraph 4.1.1 in its entirety and substitute the following:

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

1.9 ARTICLE 5: SUBCONTRACTORS

A. 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK: Add new Subparagraph 5.2.1.1.:

5.2.1.1. Within ten (10) days of notification of acceptance of his proposal, Contractor shall submit the names of those to whom he intends to award a Subcontract.

1.10 ARTICLE 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

A. 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS: Delete Subparagraph 6.1.3 in its entirety and substitute the following:

6.1.3 General Contractor shall have responsibility of coordinating efforts of all contractors and to maintain overall direction of job progress. Each Contractor shall coordinate operational methods with other contractors and encourage communications among all trades. All Contractors shall make other contractors aware of any problems, delays in materials shipments or lack of work force, and assist other contractors in maintaining job momentum and direction of overall project.
1.11 ARTICLE 9: PAYMENTS AND COMPLETION

A. 9.3 APPLICATIONS FOR PAYMENT: Add new Subparagraph 9.3.1.3

9.3.1.3.: Until Substantial Completion, the Owner will pay 90 percent of the amount due Contractor on account of approved progress payments.

1.12 ARTICLE 11: INSURANCE AND BONDS

A. 11.1.1 In the first line following the word "maintain," insert the words "in a company or companies licensed to do business in the state in which the project is located."

B. Add new Subparagraph 11.1.1.9:

11.1.1.9 General Liability Insurance shall be comprehensive, on occurrence, and shall include:

- Premises and Operations.
- Independent Contractors.
- Products and Completed Operations.
- Broad Form Property Damage.
- Personal Injury.
- Explosion, Collapse and Underground damage where the hazard exists.
- Contractual liability.

C. Add the following Sub-Subparagraphs to Subparagraph 11.1.2:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following, or greater if required by law:

1. Worker's Compensation:
   a. State: Statutory
   b. Applicable Federal: Statutory
   c. Employer's Liability: $500,000

2. Comprehensive General Liability:
   a. Bodily Injury:
      $ 500,000 Each Person
      $1,000,000 Aggregate
   b. Property Damage:
      $ 500,000 Each Occurrence
      $1,000,000 Aggregate
c. $1,000,000 Combined Single

Limit Coverage for bodily injury and property damage per occurrence and in the same aggregate limit will be accepted in lieu of the separate limits specified above.

3. Personal Injury:

$ 1,000,000 Combined single limit including owned non-owned, and hired motor vehicle.

4. Comprehensive Automobile Liability:

a. Bodily Injury:

$1,000,000 Each Person
$1,000,000 Each Occurrence

b. Property Damage:

$ 500,000 Each Occurrence
$1,000,000 Aggregate

c. $1,000,000 Combined Single

Limit coverage for bodily injury and property damage per occurrence and in the same aggregate limit will be accepted in lieu of the separate limits specified above.

11.1.2.2 Umbrella Form Liability Coverage:

An Umbrella Form Liability coverage to not less than $2,000,000 for any one occurrence and subject to the same aggregate over the Employer's Liability, Comprehensive General Liability, and Comprehensive Automobile Liability coverage is required.

D. Add the following Subparagraph 11.1.3.1:

11.1.3.1 Contractor shall furnish one copy each of Certificates of Insurance herein required for each copy of the Agreement which shall specifically set forth evidence of all coverage required by Paragraph 11.1. The form of the Certificate shall be AIA Document G705, Certificate of Insurance. Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. The Contractor shall furnish to the Owner notice of any policy cancellation at least 30 days prior to the effective date of cancellation. The Contractor shall submit copies of subcontractor's Certificates of Insurance prior to the beginning of work.
E. Add the following Subparagraph 11.1.4.1:

11.1.4.1 The Owner and Architect shall be named as additional insureds by endorsement for the purpose of coverage only with no liability for premium payments.

F. 11.3. PROPERTY INSURANCE: Delete Subparagraph 11.3.1 in its entirety and substitute the following:

11.3.1: The General Contractor shall be responsible to maintain property (builder’s risk) insurance upon the completed value of all work at the site under this contract to the full insurable value thereof. This insurance shall include the interests of the Owner, the General Contractor, Subcontractors, and Sub-subcontractors in the work and as their interests may appear in the work, and shall be an all-risk type policy, including theft, subject to the exclusions generally accepted in the insurance industry. This coverage is not intended to, and shall not, provide coverage for tools, equipment, scaffolding, forms, or other devices used by the Contractors or Subcontractors in performing work under this contract.

11.3.1.2 Delete this Paragraph in its entirety.

G. Delete Subparagraphs 11.3.1.3 in its entirety and substitute the following:

11.3.1.3 If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

1.13 ARTICLE 13: MISCELLANEOUS PROVISIONS

A. Add new paragraph 13.8 as follows:

13.8 REFERENCED STANDARDS

13.8.1 No provision of any referenced standard specification, manual or code; whether or not specifically incorporated by reference in the Contract Documents; shall be effective to change the duties and responsibilities of Owner, Contractor or Architect, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Architect, or any of Architect's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Articles 1 through 15.

END OF SECTION
ARTICLE 25: PREVAILING RATE OF WAGES

25.1 Pursuant to Illinois Compiled Statutes 820 ILCS 130/0.01 et seq., these specifications list on the following pages, the Illinois Department of Labor prevailing rate of wages for the county where the contract is being performed and for each craft or type of worker needed to execute the contract.
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**END OF SECTION**
### BIDDING & CONTRACT REQUIREMENTS

#### Document 00 86 00 - Drawings, Schedules and Details

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PM-400 MECHANICAL SCHEDULES AND DETAILS
PM-401 MECHANICAL AND PLUMBING PLANS
E-401 ELECTRICAL PLANS

All drawings dated January 20, 2020

END 00 86 00.
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.
B. Contractor's use of site and premises.
C. Owner occupancy.
D. Specification Conventions.
E. Contractor’s Duties.
F. Contract Documents.

1.2 CONTRACT DESCRIPTION

A. BASE BID PACKAGE A - WIRTH MIDDLE SCHOOL: The scope of work is the renovation of existing toilet rooms including, but not limited to, demolition of existing finishes, plumbing fixtures, light fixtures, partitions and accessories as well as the provision and installation of new plumbing fixtures, light fixtures, partitions and accessories. New finishes include ceramic tile flooring, ceramic wall tile, and ceilings. Mechanical, electrical, plumbing and fire protection work is commensurate with the scope of work. The scope also includes the abatement of approximately 54,000 square feet of asbestos containing floor tile and floor tile mastic utilizing infrared heat methods, including the removal of associated base material and installation of new vinyl flooring and rubber base. The scope also includes approximately 37,000 square feet of new suspended acoustical panel ceilings and lighting throughout classrooms and new abuse resistant ceilings and lighting in the gymnasium.

1. BID PACKAGE A ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in Base Bid A with quartz epoxy flooring.
2. BID PACKAGE A ALTERNATE BID #2: Replace the wall mounted lavatories in portions of the project with plastic laminate counter tops, counter brackets, drop in sinks, and additional wall/ceramic tile construction.

B. BASE BID PACKAGE B - LALUMIER ELEMENTARY SCHOOL: The scope of work is the renovation of existing toilet rooms including, but not limited to, demolition of existing finishes, plumbing fixtures, light fixtures, partitions and accessories as well as the provision and installation of new plumbing fixtures, light fixtures, partitions and accessories. New finishes include ceramic tile flooring, ceramic wall tile, and ceilings. Mechanical, electrical, plumbing and fire protection work is commensurate with the scope of work. The scope also includes approximately 16,000 square feet of new suspended acoustical panel ceilings and lighting throughout classrooms as well as miscellaneous classroom and exterior door replacements.
1. BID PACKAGE B ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in the Base Bid B with quartz epoxy flooring.

C. BASE BID PACKAGE C - PENNIMAN, ELIZABETH MORRIS AND MAPLEWOOD ELEMENTARY SCHOOLS: The scope of work is the renovation of existing toilet rooms including, but not limited to, demolition of existing finishes, plumbing fixtures, light fixtures, partitions and accessories as well as the provision and installation of new plumbing fixtures, light fixtures, partitions and accessories at Penniman and Maplewood Elementary Schools. New finishes include ceramic tile flooring, ceramic wall tile, and ceilings. Mechanical, electrical, plumbing and fire protection work is commensurate with the scope of work. The scope also includes miscellaneous classroom and exterior door replacements at all three schools.

1. BID PACKAGE C ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in the Base Bid C with quartz epoxy flooring.

D. BASE BID PACKAGE D - HUFFMAN ELEMENTARY SCHOOL: The scope of work is the renovation of existing toilet rooms including, but not limited to, demolition of existing finishes, plumbing fixtures, light fixtures, partitions and accessories as well as the provision and installation of new plumbing fixtures, light fixtures, partitions and accessories. New finishes include ceramic tile flooring, ceramic wall tile, and ceilings. Mechanical, electrical, plumbing and fire protection work is commensurate with the scope of work. The scope also includes miscellaneous classroom and exterior door replacements.

1. BID PACKAGE D ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in the Base Bid D with quartz epoxy flooring.

1.3 CONTRACTOR’S USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:
   1. Owner occupancy of adjacent spaces.
   2. Work by Others.
   3. Use of site and premises by the public.

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

C. Allow for public use of all adjoining streets and sidewalks.

D. Light duty vehicle parking is permitted. All parking lots and sidewalks are to be restored to their original condition.

1.4 OWNER OCCUPANCY

A. The Owner will occupy designated portions of the premises during the entire period of construction.

B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.
1.5 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

1.6 CONTRACTOR’S DUTIES

A. Except as specifically noted, Contractor shall provide and pay for:
   1. All labor, materials, and equipment used for construction of and/or incorporated into the project.
   2. All tools, construction equipment and machinery.
   3. Required building permits, and all inspection fees by governmental authorities.
   4. Other facilities and services necessary for proper execution and complete of work.

B. Owner is exempt from sales tax on product permanently incorporated in work.
   1. Obtain sales tax exemption certificate number from Owner.
   2. Place exemption certificate number on invoices for materials incorporated in work.
   3. Upon completion of work, file with Owner a notarized statement that all purchases made under exemption certificate were entitled to be exempt and furnish copies of invoice to Owner.
   4. Pay legally assessed penalties for improper use of exemption certificate number.

C. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of work.

D. Promptly submit written notice to Architect/Engineer of observed variance of contract documents from legal requirements.
   1. It is not the Contractor’s responsibility to make certain that drawings and specifications comply with codes and regulations.
      a. Appropriate modifications to contract documents will account for/reflect necessary changes.
      b. Assume responsibility for work known to be contrary to such requirements if written notice is not provided by the Contractor to the Architect.

E. Enforce strict discipline and good order among employees.

F. Do not unreasonably encumber site with materials or equipment.

G. Do not load structure with weight that will endanger structure.

H. Assume full responsibility for protection and safe-keeping of products stored on premises.

I. Move any stored products which interfere with operations of Owner or other Contractors.
J. Obtain and pay for use of additional storage or work areas needed for operations.

K. The School Board shall prohibit the use of tobacco on school property when the property is being used for any school purposes. Tobacco shall mean cigarette, cigar, pipe or tobacco in any other form including smokeless tobacco which is any loose, cut, shredded, ground, powdered, compressed or leaf tobacco that is intended to be placed in the mouth without being smoked. All members of work crews must remain fully clothed and refrain from using obscene or profane language during these same time parameters. School purposes include, but are not limited to, all interscholastic or extracurricular athletic, academic, or other events sponsored by the School Board or in which students of the District participate.

L. Contractor shall maintain building free from entrance of water at all times during construction.

M. Contractor shall furnish, erect and maintain temporary ladders, ramps, or hoists as may be required for performance of his work.
   1. All such equipment shall be substantially designed, constructed, and maintained in accordance with applicable federal, state, and local laws, ordinances, and regulations, and shall be promptly removed when no longer needed.

N. Contractor shall design, furnish, erect, maintain, and move all ladders and scaffolding required for this work.
   1. All ladders and scaffolding shall be designed, constructed, and maintained in accordance with applicable federal, state, and local law, ordinances, and regulations, and shall be promptly removed when no longer needed.

1.7 CONTRACT DOCUMENTS

A. Contractor will be furnished free of charge four (4) copies of drawings and specifications.

B. On request, additional copies will be furnished to Contractor at cost of reproduction, postage and handling.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Schedule of values.
B. Applications for payment.
C. Change procedures.
D. Defect assessment.
E. Alternates

1.2 SCHEDULE OF VALUES

A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702.
B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance.
D. Include in each line item, amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
E. Each line item shall be broken out to represent labor and materials cost separately.
F. Include separately from each line item, direct proportional amount of Contractor's overhead and profit.
G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.3 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on AIA Form G702-Application and Certificate for Payment.
B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
C. Submit updated construction schedule with each Application for Payment.
D. Payment Period: Submit applications for payment to Architect/Engineer for processing no later than 10 days prior to date established for progress payment meeting.
E. Submit with transmittal letter as specified for Submittals in Section 01 33 00.

F. Submit lien waivers.

G. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
   1. Partial release of liens from major subcontractors and vendors.
   2. Affidavits attesting to off-site stored products.
   3. Construction progress schedules, revised and current.

H. Application for Progress Payment No. 1 shall be accompanied by a notarized statement on Contractor's letterhead as follows:
   1. I certify that the funds requested for the accompanying Pay Request No. 1 will be used to pay all just and lawful bills against the undersigned and his subcontractors for labor, material and equipment employed in the performance of the work. I further certify that such bills will be paid no later than ten (10) calendar days from date of receipt of the Owner's disbursement.
   2. Execute statement with signature of a responsible officer of contracting firm.

I. Each subsequent application for progress payment shall be accompanied by the following supporting documents:
   1. Partial or final waivers of lien in monetary amount from Contractor, each material supplier and/or subcontractor reflecting amounts incorporated into preceding request for progress payment.
   2. A notarized Affidavit of Payment to Material Suppliers and Subcontractors.
      a. Affidavit shall be submitted in exact text as exhibit furnished by Architect/Engineers, signed by Contractor or Subcontractor.
      b. Include unit item, actual amount of contract without overhead or profit, amount paid to date, and amount to become due (balance of account).

J. Progress payments will be made for materials and equipment not incorporated in the work provided that:
   1. Such materials and equipment have been delivered to and suitable stored at site or some other location approved in writing by Owner and Architect/Engineer. All such materials stored off-site shall be marked or tagged with identification of project to which they are assigned.
   2. Contractor submits evidence of title to such materials and equipment.
   3. Care and custody of such materials and equipment and all costs incurred for movement and storage shall be responsibility of Contractor.
   4. Such materials and equipment are suitably insured by Contractor. Contractor shall submit a certificate of insurance showing the Owner as an additional insured and showing amount of insurance coverage of suitable proof that material and equipment are stored in a bonded warehouse.

K. Refer to Section 01 70 00 for submittal requirements for application for final payment and related closeout procedures.
1.4 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions in writing.

C. The Architect/Engineer may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within seven days.

D. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors.

E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.

F. Architect/Engineer may issue directive, on Hurst-Rosche, Inc. Change Order form signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.


H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

I. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.

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

K. Correlation Of Contractor Submittals:
   1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer.

D. Defective Work will be partially repaired to instructions of Architect/Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer.

E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of Architect/Engineer to assess defects and identify payment adjustments, is final.

G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:  
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of the Work.

ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner’s option. Accepted Alternates will be identified in Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work.

C. Schedule of Alternates:
1. BID PACKAGE A ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in Base Bid A with quartz epoxy flooring.
2. BID PACKAGE A ALTERNATE BID #2: Replace the wall mounted lavatories in portions of the project with plastic laminate counter tops, counter brackets, drop in sinks, and additional wall/ceramic tile construction.
3. BID PACKAGE B ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in the Base Bid B with quartz epoxy flooring.
4. BID PACKAGE C ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in the Base Bid C with quartz epoxy flooring.
5. BID PACKAGE C ALTERNATE BID #1: Replace the ceramic tile flooring and base material identified in the Base Bid D with quartz epoxy flooring.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION
SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.
B. Preconstruction meeting.
C. Progress meetings.
D. Pre-installation meetings.
E. Cutting and patching.
F. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown 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.
D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.
F. 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.

1.3 PRECONSTRUCTION MEETING

A. Architect/Engineer will schedule meeting after Notice of Award.
B. Attendance Required: Owner, Architect/Engineer, and Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.

D. Architect/Engineer will record minutes and distribute copies with reasonable promptness after meeting to participants, with copies to Owner, and those affected by decisions made.

1.4 PROGRESS MEETINGS

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

B. Architect/Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.

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

E. Architect/Engineer will record minutes and distribute copies with reasonable promptness after meeting to participants, with copies to Owner, and those affected by decisions made.
1.5 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

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

C. Notify Architect/Engineer four days in advance of meeting date.

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

E. Architect/Engineer will record minutes and distribute copies with reasonable promptness after meeting to participants, with copies to Owner, and those affected by decisions made.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   5. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
   3. Remove and replace defective and non-conforming Work.
   4. Remove samples of installed Work for testing.
   5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.
F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

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

J. Refinish or restore surfaces and finished to match existing finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

K. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

3.2 SPECIAL PROCEDURES

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

B. Employ skilled and experienced installer to perform alteration work.

C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

E. Remove debris and abandoned items from area and from concealed spaces.

F. Prepare surface and remove surface finishes to permit installation of new work and finishes.

G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original condition.

I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with neat transition to adjacent finishes.

J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.

L. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition; to Architect/Engineer for review.

M. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

N. Finish surfaces as specified in individual product sections.

END OF SECTION
SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References.
B. Quality assurance.
C. Format.
D. Schedules.
E. Submittals.
F. Review and evaluation.
G. Updating schedules.
H. Distribution.

1.2 REFERENCES


1.3 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel specializing in CPM scheduling with two years minimum experience in scheduling construction work of complexity comparable to this Project and having use of computer facilities capable of delivering detailed graphic printout within 48 hours of request.
B. Contractor's Administrative Personnel: two years minimum experience in using and monitoring CPM schedules on comparable projects.

1.4 FORMAT

A. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with applicable specification section number.
B. Diagram Sheet Size: 24 inches high x 36 inches width required.
C. Scale and Spacing: To allow for notations and revisions.
1.5 SCHEDULES

A. Prepare network analysis diagrams and supporting mathematical analyses using Critical Path Method, under concepts and methods outlined in AGC's "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

B. Illustrate order and interdependence of activities and sequence of work; how start of given activity depends on completion of preceding activities, and how completion of activity may restrain start of subsequent activities.

C. Illustrate complete sequence of construction by activity, identifying work of separate phases. Indicate dates for submittals and return of submittals; dates for procurement and delivery of critical products; and dates for installation and provision for testing. Include legend for symbols and abbreviations used.

D. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 15 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; accrue float time to Owner and to Owner's benefit.
   11. Monetary value of activity, keyed to Schedule of Values.
   12. Percentage of activity completed.

E. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, of accepting revised completion dates, and recomputation of scheduled dates and float.

F. Required Sorts: List activities in sorts or groups:
   1. By preceding work item or event number from lowest to highest.
   2. By longest float, then in order of early start.
   3. By responsibility in order of earliest possible start date.
   4. In order of latest allowable start dates.
   5. In order of latest allowable finish dates.
   6. Contractor's periodic payment request sorted by Schedule of Values listings.
   7. Listing of basic input data generating report.
   8. Listing of activities on critical path.

G. Prepare sub-schedules for each stage of Work identified in Section 01 10 00.

H. Coordinate contents with schedule of values in Section 01 33 00.
1.6  SUBMITTALS

A. Within 10 days after date of Owner-Contractor Agreement, submit proposed preliminary network diagram defining planned operations for first 60 days of Work, with general outline for remainder of Work.

B. Participate in review of preliminary and complete network diagrams jointly with Architect/Engineer.

C. Within 10 days after joint review of proposed preliminary network diagram, submit draft of proposed complete network diagram for review. Include written certification that mechanical and electrical Subcontractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete network analysis consisting of network diagrams and mathematical analysis.

E. Submit updated network schedules with each Application for Payment.

F. Submit number of opaque reproductions Contractor requires, plus two copies Architect/Engineer will retain.

G. Submit under transmittal letter form specified in Section 01 33 00.

1.7  REVIEW AND EVALUATION

A. Participate in joint review and evaluation of network diagrams and analysis with Architect/Engineer at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise network diagrams and analysis incorporating results of review, and resubmit within 10 days.

1.8  UPDATING SCHEDULES

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. Update diagrams to graphically depict current status of Work.

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

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

E. Submit sorts required to support recommended changes.
F. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect including effects of changes on schedules of separate contractors.

1.9 DISTRIBUTION

A. Following joint review, distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect/Engineer, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION
SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.
B. Construction progress schedules.
C. Proposed products list.
D. Product data.
E. Shop drawings.
F. Design data.
G. Test reports.
H. Certificates.
I. Manufacturer's instructions.

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal with shop drawing submittal form found at the end of this section. A copy of the submittal form must be attached to each copy of the submittal; if not, the submittal will be rejected and returned to the Contractor.

B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

C. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

E. Schedule submittals to expedite Project and deliver to Architect/Engineer at business address. Coordinate submission of related items.

F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.

G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
H. Allow space on submittals for Contractor and Architect/Engineer review stamps.
I. When revised for resubmission, identify changes made since previous submission.
J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
K. Submittals not requested will not be recognized or processed.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within 15 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within ten days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

E. Submit computer generated horizontal bar chart with separate line for each major portion of Work or operation, identifying first work day of each week.

F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of Work at each submission.

H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including products identified under Allowances, and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.

I. Indicate delivery dates for products identified under Allowances.

J. Revisions To Schedules:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.
1.4 PROPOSED PRODUCTS LIST

A. Within 15 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit number of copies Contractor requires, plus 3 copies Architect/Engineer will retain.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00.

1.6 SHOP DRAWINGS

A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
   1. Include signed and sealed calculations to support design.
   2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
   3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Submit number of opaque reproductions Contractor requires, plus 3 copies Architect/Engineer will retain.
E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00.

1.7 DESIGN DATA
A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.8 TEST REPORTS
A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 CERTIFICATES
A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.10 MANUFACTURER'S INSTRUCTIONS
A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data.
B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

PART 2 PRODUCTS
Not Used.

PART 3 EXECUTION
Not Used.

END OF SECTION
SHOP DRAWING SUBMITTAL

PROJECT: Summer 2020 H/LS Improvements
Cahokia USD #187
Cahokia, St. Clair County, Illinois

DATE:____________________

A/E PROJECT NO: 150-2229

CONTRACTOR: __________________________
____________________________
____________________________

PRESENTED BY: 
(Subcontractor/Supplier) Company Name
____________________________
Address
____________________________
Phone/Fax
____________________________
Contact Person

ITEM: __________________________

SPEC SECTION: __________________________

By approving and submitting these shop drawings, product data and samples, we represent that we have determined and verified all materials, field measurements and field construction criteria related thereto, or will do so, and that we have checked and coordinated information contained within submittal with requirements of the work and contract documents.

Contractor’s Signature

____________________________________________
Date

____________________________
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.
B. Tolerances
C. References.
D. Testing and inspection services.
E. Examination.
F. Preparation.

1.2 QUALITY CONTROL AND 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. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer 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. Perform Work by persons qualified to produce required and specified quality.
F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.

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

D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 TESTING AND INSPECTION SERVICES

A. Architect/Engineer will employ and pay for specified services of an independent firm to perform testing and inspection.

B. Employment of testing laboratory will in no way relieve Contractor’s obligations to perform work in accord with the Contract.

C. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed at the direction of the Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

D. Responsibilities:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
   6. Perform additional tests required by Architect/Engineer.

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

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

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

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

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

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

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

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

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:
   1. Temporary electricity.
   2. Temporary water service.
   3. Temporary sanitary facilities.

B. Construction Facilities:
   1. Vehicular access.
   2. Parking.
   3. Progress cleaning and waste removal.

C. Temporary Controls:
   1. Barriers.
   2. Water control.
   3. Dust control.
   4. Erosion and sediment control.
   5. Noise control.
   6. Pest control.
   7. Pollution control.
   8. Rodent control.

D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

A. Owner will pay cost of energy used. Exercise measures to conserve energy. Utilize Owner’s existing power service.

B. Complement existing power service capacity and characteristics as required for construction operations.

C. Permanent convenience receptacles may not be utilized during construction.

D. Provide flexible power cords as required for portable construction tools and equipment.

1.3 TEMPORARY WATER SERVICE

A. Owner will pay cost of temporary water. Exercise measures to conserve energy. Utilize Owner's existing water system, extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.
1.4 TEMPORARY SANITARY FACILITIES
   A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of project mobilization.

1.5 VEHICULAR ACCESS
   A. Use designated existing on-site roads for construction traffic.

1.6 PARKING
   A. Use of designated existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles not allowed on paved areas.
   B. Use of designated areas of existing parking facilities used by construction personnel is permitted.
   C. Do not allow heavy vehicles or construction equipment in parking areas.
   D. Maintenance:
      1. Maintain traffic and parking areas in sound condition.
      2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

1.7 PROGRESS CLEANING AND WASTE REMOVAL
   A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
   B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.
   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 rubbish from site weekly and dispose off-site.
   E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
1.8 BARRIERS
A. Provide barriers to prevent unauthorized entry to construction areas, 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 barricades and covered walkways required by authorities having jurisdiction for public rights-of-way and for public access to existing building.
C. Provide protection for plants designated to remain. Replace damaged plants.
D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.9 WATER CONTROL
A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water.

1.10 DUST CONTROL
A. Execute Work by methods to minimize raising dust from construction operations.
B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.11 EROSION AND SEDIMENT CONTROL
A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
B. Minimize surface area of bare soil exposed at one time.
C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.12 NOISE CONTROL
A. Provide methods, means, and facilities to minimize noise produced by construction operations.
1.13 PEST CONTROL
   A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work or entering facility.

1.14 POLLUTION CONTROL
   A. 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.

1.15 RODENT CONTROL
   A. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.16 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS
   A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
   B. Clean and repair damage caused by installation or use of temporary work.
   C. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS
   Not Used.

PART 3 EXECUTION
   Not Used.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.
B. Product delivery requirements.
C. Product storage and handling requirements.
D. Product options.
E. Product substitution procedures.
F. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.
B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.
B. Store with seals and labels intact and legible.
C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
D. For exterior storage of fabricated products, place on sloped supports above ground.
E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

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

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

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

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

1.5 PRODUCT OPTIONS

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

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.

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

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for Substitution as for specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
   3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 EXECUTION

Not Used.

END OF SECTION
SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.
B. Final cleaning.
C. Protecting installed construction.
D. Project record documents.
E. Operation and maintenance data.
F. Manual for materials and finishes.
G. Product warranties and product bonds.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
B. Provide submittals to Architect/Engineer required by authorities having jurisdiction.
C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
D. Provide a notarized Affidavit for Final Completion in exact text as exhibit furnished by Architect/Engineer, signed by Contractor.
E. Owner will occupy all of building as specified in Section 01 10 00.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.
B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
D. Clean debris from roofs, gutters, downspouts, and drainage systems.
E. Clean site; sweep paved areas, rake clean landscaped surfaces.
F. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.
B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
F. Prohibit traffic from landscaped areas.

1.5 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress, not less than weekly.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.
F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
2. Details not on original Contract drawings.

G. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component.
   d. Operating instructions.
   e. Maintenance instructions for equipment and systems.
   f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.
   b. Certificates.
   c. Photocopies of warranties and bonds.

1.7 MANUAL FOR MATERIALS AND FINISHES

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.

D. Submit two sets of revised final volumes in final form within 10 days after final inspection.

E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.


H. Additional Requirements: As specified in individual product specification sections.

I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.8 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time Of Submittals:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten 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 ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION
SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 DEFINITIONS
   A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
   B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 SUBMITTALS
   A. Section 01 33 00 – Submittal procedures.
   B. Product Data: For cementitious materials, admixtures, steel reinforcement and accessories, vapor retarders and joint filler strips.
   C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 PRECONSTRUCTION TESTING
   A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing and protecting products.
   B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301
2. ACI 117
3. ACI 318
4. ACI 305.1
5. ACI 306.1
6. ACI 308.1

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class F or C.
3. Slag Cement: ASTM C 989, Grade 100 or 120.
C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.


F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494, Type A.
   2. Retarding Admixture: ASTM C 494, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

G. Water: ASTM C 94 and potable.

2.5 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A, minimum thickness of 10 mil. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.7 RELATED MATERIALS

2.8 Repair Materials

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109.

2.9 Concrete Mixtures, General

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.10 Concrete Mixtures for Building Elements

A. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Slump Limit: 4 inches, plus or minus 1 inch.
3. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.2 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
3.3 JOINTS

A. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
3.5 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   a. Specified overall values of flatness, \( F(F) \geq 35 \); and of levelness, \( F(L) \geq 25 \); with minimum local values of flatness, \( F(F) \geq 24 \); and of levelness, \( F(L) \geq 17 \); for slabs-on-grade.

3. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed \( 3/16 \) inch.

C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated in drawings.

3.6 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching \( 0.2 \text{ lb/sq. ft. x h} \) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.7 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.8 FIELD QUALITY CONTROL

A. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, pressure method, for light-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

B. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes mortar and grout for masonry.

B. Related Sections:
   1. Section 04 20 00 – Unit Masonry: Installation of mortar and grout.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 530 - Building Code Requirements for Masonry Structures.
   2. ACI 530.1 - Specifications for Masonry Structures.

B. ASTM International:
1.3 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
B. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.
C. Test Reports:
   1. Submit reports on mortar indicating conformance of component mortar materials to requirements of ASTM C270 and test and evaluation reports to ASTM C780 for aggregate ratio and water content, air content, consistency and compressive strength.
   2. Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to ASTM C1019.
D. Manufacturer’s Installation Instructions: Submit manufacturer’s installation instruction.

1.4 QUALITY ASSURANCE
A. Perform Work in accordance with TMS MSJC Code and TMS MSJC Specification.

PART 2 PRODUCTS

2.1 MORTAR AND MASONRY GROUT
A. Manufacturers:
   1. Blue Circle Cement.
   2. CTS Cement Manufacturing Co.
   3. Lehigh Cement Co.
   4. Medusa Cement Co.
   5. The Quikrete Companies.
   7. Southern Grouts and Mortars.

2.2 COMPONENTS
A. Portland Cement: ASTM C150, Type I white color unless specified in contract plans.
B. Mortar Aggregate: ASTM C144, standard masonry type.
C. Hydrated Lime: ASTM C207, Type S.
D. Grout Aggregate: ASTM C404, fine or coarse as applicable to site conditions.
E. Water: Clean and potable.
F. Calcium chloride is not permitted.
2.3 MIXES

A. Mortar Mixes:

B. Mortar Mixing:
   1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
   2. Achieve uniformly damp sand immediately before mixing process.
   3. Add mortar color to achieve uniformity of mix and coloration.
   4. Re-temper only within two hours of mixing.

C. Grout Mixes:
   1. Grout for Structural and Non-Structural Masonry shall be Self-Consolidating Grout in accordance with ASTM C476: 2,500 psi strength at 28 days; Slump Flow Test in accordance with ASTM C1611, Fine or Coarse grout as applicable.
   2. Application:
      a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
      b. Fine Grout: For grouting other spaces.

D. Grout Mixing:
   1. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476.
   2. Add admixtures; mix uniformly.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services.

B. Testing of Mortar Mix: In accordance with ASTM C780 for aggregate ratio and water content, air content, consistency, and compressive strength.
C. Testing of Grout Mix: In accordance with ASTM C1019 for compressive strength, and in accordance with ASTM C1611 for slump flow.

D. Test flexural bond strength of mortar and masonry units to ASTM C1357; test in conjunction with masonry unit sections specified.

E. Test compressive strength of mortar and masonry to ASTM C1314; test in accordance with masonry unit sections specified.

END OF SECTION
SECTION 04 20 00 - UNIT MASONRY (ALTERNATE BID #2)

PART 1 GENERAL

1.1 SUMMARY

A. Section includes concrete masonry units; reinforcement, anchorage and accessories.

B. Related Sections:
   1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 530 - Building Code Requirements for Masonry Structures.
   2. ACI 530.1 - Specifications for Masonry Structures.

B. ASTM International:
   5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   6. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   9. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
  10. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
  12. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.

C. National Fire Protection Association:
D. Underwriters Laboratories Inc.:

1.3 PERFORMANCE REQUIREMENTS

A. Concrete Masonry Compressive Strength (f'm): 2,000 determined by unit strength method.
   1. Concrete Masonry Units: 3,000 psi minimum net area compressive strength.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Product Data:
   1. Submit data for concrete masonry units.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.

B. Source Control: Obtain each type of exposed masonry unit from a single manufacturer, with texture and color of each type uniform or of a uniform blend acceptable to the Architect/Engineer.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept units on site. Inspect for damage.

C. Store masonry drainage mat in clean, dry, sheltered area, off ground until used. Protect packaging from direct exposure to sun.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Hollow Non-Load Bearing Concrete Masonry Units (CMU): ASTM C129; medium weight; moisture controlled.

B. Concrete Masonry Unit Size and Shape: Nominal modular size of 6 x 8 x 16 inches.
2.2 ACCESSORIES

A. Mortar and Grout: As specified in Section 04 05 03.

B. Reinforcing Bars: As specified in Division 3 and as indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify items provided by other sections of work are properly sized and located.

D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

3.3 INSTALLATION

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.

C. Coursing of Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.

D. Placing And Bonding:
   1. Lay hollow masonry units with face shell bedding on head and bed joints.
   2. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
   3. Remove excess mortar as work progresses.
   4. Interlock intersections and external corners.
   5. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
   6. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
   7. Cut mortar joints flush where wall tile is scheduled.
   8. Isolate masonry from vertical structural framing members with movement joint.
   9. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.
E. Cutting And Fitting:
   1. Cut and fit for chases, pipes, conduit, sleeves, grounds, and. Coordinate with other sections of work to provide correct size, shape, and location.
   2. Obtain Architect/Engineer’s approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 ERECTION TOLERANCES

   A. Section 01 40 00 - Quality Requirements: Tolerances.
   B. Maximum Variation From Alignment of Columns: Pilasters: 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 feet and 1/2 inch in 20 feet 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 feet and 1/4 inch in 10 feet.
   G. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
   H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.5 FIELD QUALITY CONTROL

   A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
   B. Concrete Masonry Units: Test each type in accordance with ASTM C140.

3.6 CLEANING

   A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
   B. Remove excess mortar and mortar smears as work progresses.
   C. Replace defective mortar. Match adjacent work.
   D. Clean soiled surfaces with cleaning solution. Use non-metallic tools in cleaning operations.
3.7 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect exposed external corners subject to damage. Protect base of walls from mud and mortar splatter.

C. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes concealed wood blocking for support of toilet and bath accessories; and fire retardant treatment of wood.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers’ Association:
   1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
   2. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.

C. ASTM International:

D. National Fire Protection Association:

E. The Redwood Inspection Service:

F. Southern Pine Inspection Bureau:
   1. SPIB - Standard Grading Rules for Southern Pine Lumber.

G. Underwriters Laboratories Inc.:

H. U. S Department of Commerce National Institute of Standards and Technology:
   1. DOC PS 1 - Construction and Industrial Plywood.
   2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.

I. West Coast Lumber Inspection Bureau:
   1. WCLIB - Standard Grading Rules for West Coast Lumber.

J. Western Wood Products Association:
   1. WWPA G-5 - Western Lumber Grading Rules.
1.3 SUBMITTALS
   A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
   B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

1.4 COORDINATION
   A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
   B. Coordinate Work of this Section with installation of prefabricated wood trusses.

1.5 QUALITY ASSURANCE
   A. Perform Work in accordance with the following:
   B. Surface Burning Characteristics:
      1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84 NFPA 255 UL 723.
   C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
   B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
   C. Store materials according to manufacturer instructions.

PART 2 PRODUCTS

2.1 MATERIALS
   A. Lumber Grading Rules: AP&PA, SPIB and WCLIB.
   B. Miscellaneous Framing: Stress Group D, S/P/F, species, grade 19 percent maximum moisture content after treatment, pressure preservative treat.
2.2 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
   3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

2.3 FACTORY WOOD TREATMENT

A. Fire Retardant Treatment: Pressure treatment, AWPA C20 for lumber and AWPA C27 for plywood, Interior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development of 25/450.

B. Moisture Content After Treatment:
   1. Lumber: Maximum 19 percent.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify substrate conditions are ready to receive blocking.

3.2 PREPARATION

A. Coordinate placement of blocking.

3.3 INSTALLATION

A. Set members level and plumb, in correct position.

B. Place horizontal members, crown side up.

END OF SECTION
SECTION 07 90 00 - JOINT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparing sealant substrate surfaces.
   2. Sealant and backing.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM C717 - Standard Terminology of Building Seals and Sealants.
   2. ASTM C834 - Specification for Latex Sealants.
   4. ASTM D1056 - Flexible Cellular Material- Sponge or Expanded Rubber.

B. Federal Specifications (FS):
   1. FS SS-S-200 - Sealing Compounds, Two Component, Elastomeric, Polymer Type, Jet-Fuel Resistant, Cold Applied.
   2. FS TT-S-1657 - Sealing Compound, Single Component Butyl Rubber Based Solvent Release Type (for Buildings and other Types of Construction).
   3. COORDINATION

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with Sections referencing this Section.

1.4 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Procedures for submittals.
   1. Product Data: Product chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect products.

B. Deliver Products in manufacturer's original unopened containers or packages with labels intact, identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions, where applicable.

C. Store and handle materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

D. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements: Install sealant during manufacturer's recommended temperature ranges and weather conditions for application and cure. Consult manufacturer when sealant cannot be applied during recommended conditions.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

B. Warranty:
   1. Submit written warranty signed by sealant manufacturer agreeing to replace sealants and accessories which fail because of loss of cohesion or adhesion or which do not cure.
   2. Warranty Period: 5 years or longer per the manufacturers’ standard warranties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated into the work include the following:
   2. Dow Corning, Midland, MI (517) 496-4000.
   3. GE Silicones, Waterford, NY (518) 233-3330.
11. USG Corp., Chicago, IL (800) 874-4968, (312) 606-4000.

2.2 BUILDING SEALANTS (See Sealant Schedule at the end of this Section for specific use of sealants.)

A. Urethanes:
   b. Vulkem 245, by Mameco.
   d. NR-200 Urexpan, by Pecora Corporation.
2. Type 2: Two-Part Urethane: Non-Sag, ASTM C920, Type M, Grade NS, Class 25.
   a. Chem-Calk 500, by Bostik.
   b. Vulkem 227, by Mameco.
   c. Sonolastic NP 2, by Sonneborn Building Products, ChemRex Inc.
   a. Vulkem 45, by Mameco.
   c. Sonolastic SL1, by Sonneborn Building Products, ChemRex Inc.
   d. Sikaflex 1C-SL by Sika.
4. Type 4: One-Part Urethane: Non-Sag, ASTM C920, Type S, Grade NS, Class 25.
   c. Sonolastic NP I, by Sonneborn Building Products, ChemRex Inc.

B. Silicones:
1. Type 1: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 50.
   a. 795 Silicone Building Sealant, by Dow Corning.
   b. 864 Architectural Silicone Sealant, by Pecora Corporation.
2. Type 2: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25.
   a. 999-A Silicone Building & Glazing Sealant, Dow Corning.
   b. 999-A, Dow Corning.
   c. 860 Glaziers and Contractors Silicone Sealant, by Pecora Corporation. (colors only)
4. Type 4: One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25 or 50.
   a. 786 Mildew Resistant Silicone Sealant, Dow Corning.
   b. SCS 1700 Sanitary Sealant, General Electric.
   c. 898 Silicone Sanitary Sealant, Pecora Corporation.
C. Acrylics, Latex:
   1. Type 1: One-Part Acrylic Latex, Non-Sag, ASTM-C-834-76.
      a. Chem-Calk 600, by Bostik.
      b. LC-130, by MACCO Adhesives, The Glidden Company.
      d. AC-20+Silicone Acrylic Latex, by Pecora Corporation.
      e. Sonolac, Sonneborn Building Products, ChemRex Inc.

D. Acoustical Sealants:
   1. Type 1: AC-20 FTR Acoustical and Insulation Sealant, by Pecora Corporation.
   2. Type 2: 60+ Unicrylic, by Pecora Corporation.
   3. Type 3: Sheetrock Acoustical Sealant, by United States Gypsum.

E. Butyls:
   1. Type 1: One-Part Butyl, Non-Sag, FS TT-S-1657.
      a. Chem-Calk 300, by Bostik.
      b. BC-158 Butyl Rubber, by Pecora Corporation. (ASTM C1085)

F. Preformed Compressible & Non-Compressible Fillers:
   1. Type 1: Backer Rod - Closed cell polyethylene foam:
      a. HBR Backer Rod, by Nomaco.
      b. #92 Greenrod, by Nomaco.
      c. Sonofoam Closed-Cell Backer Rod, Sonneborn Building Products, ChemRex Inc.
   2. Type 2: Backer Rod - Open cell polyurethane foam:
      a. Denver Foam, by Backer Rod Mfg Inc.
   3. Type 3: Neoprene compression seals:
      a. WE, WF, and WG Series, by Watson Bowman & Acme Corp.
      b. Will-Seal 150 Precompressed Expanding Foam Sealants, by Will-Seal, a Division of Illbruck.
   4. Type 4: Butyl Rod: Kirkhill Rubber Co. (714)529-4901.

G. Bond Breaker Tape: Polyethylene tape of plastic as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate of joint filler must be avoided for proper performance of sealant

2.3 COLORS

A. Generally use sealant colors matching color of material joint is located in.

Where a joint occurs between two materials of differing colors and Contractor cannot determine which material to match, contact Architect / Engineer for selection.
2.4 ACCESSORIES

A. Joint Cleaner: Provide type of non-corrosive and non-staining joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.

B. Primer: Non-staining as recommended by sealant manufacturer.

C. Masking tape and similar accessories to protect surfaces from damage.

D. Joint Backing:
   1. Round foam rod, compatible with sealant.
   2. Size: Oversized 30 to 50 percent larger than joint width.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for application examination.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
   1. Verify that joint widths are in conformance with sealant manufacturer allowable limits.
   2. Verify that contaminants capable of interfering with adhesion have been cleaned from joint and joint properly prepared.
   3. Verify that joint backing and release tapes are compatible with sealant.

C. Report in writing to Architect / Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for application preparation.

B. Comply with ASTM C1193.

C. Clean and prime joints.

D. Prepare and size joints in accordance with manufacturer's instructions. Clean substrates of dirt, laitance, dust, or mortar using solvent, abrasion, or sandblasting as recommended by manufacturer. Remove loose materials and foreign matter which might impair adhesion of sealant.
E. Verify that joint backing and release tapes are compatible with sealant. Verify sealant is suitable for substrate. Verify that sealant is paintable if painted finish is indicated.

F. Protect materials surrounding work of this Section from damage or disfiguration.

3.3 INSTALLATION

A. Comply with ASTM C1193.

B. Install sealant in accordance with manufacturer's published instructions.

C. Prime or seal joint surfaces where recommended by sealant manufacturer. Do not allow primer or sealer to spill or migrate onto adjoining surfaces.

D. Install backer rod and bond breaker tape where required by manufacturer.

E. Install preformed compressible and non-compressible fillers in accordance with manufacturer's published instructions.

F. Install sealants to depths recommended by sealant manufacturer in uniform, continuous ribbons free of air pockets, foreign embedded matter, ridges, and sags, "wetting" joint bond surfaces equally on both sides.

G. Tool joints concave unless shown otherwise. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form slight cove so that joint will not trap moisture and foreign matter. Dry tool joints. Do not use soap, water, or solvent to tool joints.

3.4 CURING

A. Cure sealants in compliance with manufacturer's published instructions.

3.5 CLEANING

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Remove excess and spillage of sealants promptly as the work progresses, using materials and methods as recommended by sealant and substrate manufacturers. Clean adjoining surfaces to eliminate evidence of spillage without damage to adjoining surfaces or finishes.
3.6 SEALANT SCHEDULE

A. Interior Joints:
   1. Seal interior perimeters of exterior openings.
   2. Expansion and control joints on interior of exterior cast-in-place concrete walls.
   3. Expansion and control joints on interior of exterior precast, architectural wall panels.
   4. Expansion and control joints on interior of exterior masonry walls.
   5. Perimeters of interior hollow metal and aluminum frames.
   6. Interior masonry vertical control joints and intersecting masonry walls; CMU-to-CMU, CMU-to-concrete.
   7. Joints at intersection of exterior masonry walls and interior gypsum board partitions.
   8. For all of the above interior joints:
      a. Sealant Urethane Type 2
      b. Sealant Urethane Type 4
      c. Sealant Silicone Type 1 (for prefinished materials only)
   9. Exposed interior control joints in drywall and concealed joints.
      a. Sealant Acrylic, Latex, Type 1
      b. Sealant Acoustical Type 1
      c. Sealant Acoustical Type 3
      d. Sealant Butyl Type 1
   10. Joints of underside of precast beams or planks.
       a. Sealant Urethane Type 2
       b. Sealant Urethane Type 4
       a. Sealant Urethane Type 2
       b. Sealant Urethane Type 4
   12. Perimeter of bath fixtures: sinks, tubs, urinals, waterclosets, basins, vanities, etc.
       a. Sealant Silicone Type 4
   13. Interior expansion and control joints in floor surfaces exposed to foot traffic.
       a. Sealant Urethane Type 2
       b. Sealant Urethane Type 4
       c. Preformed Compressible & Non-Compressible Filler Type 1
       a. Paving Sealant Type 1
   15. Interior non-moving joints, including control, contraction, or construction joints, in interior floor slabs exposed to heavy duty traffic.
       a. Paving Sealant Type 1
       a. Sealant Silicone Type 1

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes non-rated steel frames.

B. Related Sections:
   1. Section 08 13 14 – Standard Steel Doors.
   2. Section 08 14 16 – Flush Wood Doors.
   3. Section 08 71 00 - Door Hardware.
   4. Section 08 80 00 – Glazing.
   5. Section 09 90 00 – Painting and Coating: Field painting of frames.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. ASTM International:
   1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.

C. Product Data: Submit frame configuration and finishes. Submit special installation instructions.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
B. Accept frames on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with frame opening construction, door, and hardware installation.

PART 2 PRODUCTS

2.1 STANDARD STEEL FRAMES

A. Manufacturers: (All hollow metal doors and frames shall be from the same manufacturer).
   1. Amweld Building Products, Inc.
   2. Ceco Door Products.
   3. Republic Builders Products.
   4. Steelcraft.
   5. Curries Company.
   6. Mesker Door Inc.
   7. Substitutions: Not Permitted.

B. Product Description: Standard shop fabricated steel frames, fire rated and non-rated types.
   2. Interior Frames: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage/0.053 inch galvannealed steel.

C. Include galvannealed components and internal reinforcements with galvannealed frames.

2.2 ACCESSORIES

A. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws and as required for fire ratings indicated.

B. Primer: ANSI A250.10 rust inhibitive type.

C. Silencers: Resilient rubber fitted into drilled hole.

D. Weatherstripping: Specified in Section 08 71 00.

2.3 FABRICATION

A. Fabricate frames as welded unit. Knock down frames shall not be acceptable without written permission from Architect / Engineer.

B. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
C. Fabricate frames with hardware reinforcement plates welded in place.

D. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

E. Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.

2.4 SHOP FINISHING

A. Steel Sheet: Galvannealed to ASTM A653 A60.

B. Primer: Frames and frame components are required to be cleaned, phosphatized, and finished with one coat of baked-on rust inhibiting prime paint in accordance with the ANSI/SDI A250.10 “Test Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.”

C. Field finish per Section 09 90 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install frames in accordance with ANSI A250.8.

B. Coordinate with gypsum board wall construction for anchor placement.

C. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 13 14 and 08 14 16.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.4 SCHEDULE

A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes non-rated and thermally insulated, steel doors and panels.

B. Related Sections:
   1. Section 08 12 14 - Standard Steel Frames.
   2. Section 08 71 00 - Door Hardware.
   3. Section 08 80 00 - Glazing: Glass for doors.
   4. Section 09 90 00 - Painting and Coating: Field painting of doors.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   4. ASTM E413 - Classification for Rating Sound Insulation.

C. Hollow Metal Manufacturers Association:
   1. HMMA 810 - Hollow Metal Doors.

D. Steel Door Institute:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, and finishes.

C. Product Data: Submit door configurations, location of cut-outs for hardware reinforcement.

D. Manufacturer's Installation Instructions: Submit special installation instructions.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI A250.8.

B. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Break seal on site to permit ventilation.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work with door opening construction, door frame, and door hardware installation.

C. Coordinate installation to accommodate door hardware electric wire connections.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

A. Manufacturers: (All hollow metal doors and frames shall be from the same manufacturer).
   1. Amweld Building Products, Inc.
   2. Ceco Door Products.
   3. Republic Builders Products.
   4. Steelcraft.
   5. Curries.
   6. Mesker Door Inc.
   7. Substitutions: Not permitted.
B. Product Description:
      a. Level 3 - Extra heavy Duty, Model 2, seamless design.

2.2 COMPONENTS
A. Face: Steel sheet in accordance with ANSI A250 and SDI 108.
B. End Closure: Channel, 0.04 inches thick, flush.
C. Core: Polystyrene foam, mineral fiberboard with steel channel grid and vertical steel stiffeners.
D. Thermal Insulated Door: Total insulation not less than R-Value of 5.0, measured in accordance with ASTM C1363.

2.3 ACCESSORIES
A. Removable Stops: Rolled steel, channel shape, mitered corners; prepared for countersink style tamper proof screws.
B. Primer: ANSI A250.10 rust inhibitive type.

2.4 FABRICATION
A. Fabricate doors with hardware reinforcement welded in place.

2.5 SHOP FINISHING
A. Steel Sheet: Galvannealed to ASTM A653 A60.
B. Primer: Frames and frame components are required to be cleaned, phosphatized, and finished with one coat of baked-on rust inhibiting prime paint in accordance with the ANSI/SDI A250.10 “Test Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.”
C. Field finish as specified in Section 09 90 00.

PART 3 EXECUTION

3.1 EXAMINATION
A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting Work.
B. Verify opening sizes and tolerances are acceptable.
3.2 INSTALLATION

A. Install doors in accordance with ANSI A250.8.

B. Coordinate installation of glass and glazing specified in Section 08 80 00.

C. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.

D. Touch-up damaged shop finishes.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for adjusting.

B. Adjust door for smooth and balanced door movement.

3.5 SCHEDULE

A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes flush wood doors; flush configuration; rated and non-rated and door louvers.

B. Related Requirements:
   1. Section 08 12 14 - Standard Steel Frames.
   2. Section 08 71 00 - Door Hardware.
   3. Section 08 80 00 – Glazing.
   4. Section 09 90 00 - Painting and Coating: Touch-up of factory finish.

1.2 REFERENCE STANDARDS

A. American National Standards Institute:
   1. ANSI A135.4 - Basic Hardboard.

B. Architectural Woodwork Institute:

C. Hardwood Plywood and Veneer Association:
   1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

D. Intertek Testing Services (Warnock Hersey Listed):
   1. ITS-WH – Certification Listings.

E. National Fire Protection Association:

F. Underwriters Laboratories Inc.:
   1. UL – Building Materials Directory.
   2. UL 10B – Fire Tests of Door Assemblies.
   3. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
   4. UL 1784 - Air Leakage Tests of Door Assemblies.

G. Wood Window and Door Manufacturers Association:
   1. WDMA LS 1A - Architectural Wood Flush Doors.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with door opening construction, door frame and door hardware installation.
1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Submit data for door core materials and construction.
   2. Submit data for veneer species, type and characteristics.
   3. Submit data for factory finishes.

C. Shop Drawings:
   1. Indicate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, and factory machining criteria.
   2. Indicate cutouts for glazing and louvers.

D. Samples:
   1. Submit two samples of door veneer, 6 x 6 inch in size illustrating wood grain, stain color, and sheen.

E. Manufacturers' Instructions: Submit special installation instructions.

F. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AWI AWS Custom Grade.

B. Fire Rated Door Construction: Conform to one of the following:
   1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
   2. UL 10C.
   3. 20-Minute Fire Rated Corridor Doors: Fire tested without hose stream test.

C. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.

D. Attach label from agency approved by authority having jurisdiction to identify each fire rated door. Install label in location not obscured by continuous hinges specified in Section 08 70 00.

E. Finish doors in accordance with AWI AWS Custom Grade.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Package, deliver and store doors in accordance with AWI AWS Section 2.

C. Accept doors on site in manufacturer's packaging. Inspect for damage.
   1. Break seal on site to permit ventilation.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction. Include reasonable costs of re-finishing and re-installation.

C. Interior Doors:
   1. Factory Finished Doors: Furnish manufacturer’s life of installation warranty.

PART 2 PRODUCTS

2.1 FLUSH WOOD DOORS

A. Manufacturers:
   1. Eggers Industries.
   2. Algoma Hardwoods Inc.
   3. Graham Manufacturing Corp.
   5. Oshkosh Door Company.
   6. VT Industries.
   7. Section 01 60 00 – Not Permitted.

B. Flush Interior Doors: Solid core flush wood doors; wood veneer facing material; non-rated types; flush design; without louvers; factory pre-fit; and factory finished.
   1. Flush Interior Doors: 1-3/4 inches thick, unless noted otherwise on Drawings; solid core, five or seven ply construction.
   2. Color: As selected by Architect / Engineer from manufacturer’s full range of color selections.

2.2 MATERIALS

A. Door Cores: AWI AWS Section 9.
   1. Solid Core, Fire Rated:
      a. Type FD; fire resistive composite.
   2. Solid Core, Non-Fire Rated:
      a. Type: PC; particleboard.
B. Interior Door Faces: AWI AWS Section 4.
      a. Species: Red Oak.

C. Facing Adhesive: Type I – water proof.

2.3 FABRICATION

A. Fabricate doors in accordance with AWI AWS Section 9 requirements.

B. Furnish blocking as needed to eliminate through bolt holes and maintain warranty.

C. Vertical Exposed Edge of Stiles: Hardwood of same species and finish as veneer facing.

D. Bond stiles and rails to core and sand flat prior to application of cross band and face veneer.

E. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

F. Factory fit doors for frame opening dimensions identified on shop drawings.

G. Provide edge clearances in accordance with AWI AWS Section 9.

2.4 ACCESSORIES

A. Louvers:
   1. Material and Finish: Roll formed steel; pre-painted finish to color as selected by Architect / Engineer.
   2. Louver Blade: Inverted V or Y blade, sight proof.

B. Glazing:
   1. As specified in Section 08 80 00.
   2. Glazing Stops: Wood with metal clips for rated doors.

2.5 FINISHES

A. Finish work in accordance with AWI AWS Section 5; Custom Grade.

B. Transparent Finish System: Stained, transparent color; satin sheen, as indicated.
   1. System 9; UV curable polyester, urethane.

C. Factory finish doors in accordance with approved sample.

D. Factory seal door top edge with clear sealer.
   1. Re-seal in field if field fitting is required.
PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify 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.

3.2 INSTALLATION

A. Install doors in accordance with AWI AWS Section 9, and manufacturer's instructions.

B. Field Fitting and Trimming:
   1. Trim non-rated door width by cutting equally on both jamb edges.
   2. Trim door height by cutting bottom edges to maximum of 3/4 inch.
      a. Trim fire door height at bottom edge only, in accordance with fire rating requirements.

C. Install door louvers plumb and level.

D. Coordinate installation of glass and glazing specified in Section 08 80 00.

E. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.

3.3 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Conform to AWI AWS Section 9 requirements for fit and clearance tolerances and WDMA standards and testing methods for warp, cup, bow and telegraphing.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.

B. Adjust door for smooth and balanced door movement. Adjust door closer for full closure.

3.5 SCHEDULE

A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION
SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes non-rated access doors and panels with frames.
   1. Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
   2. Coordinate exact locations with various trades to assure proper placement of access doors and panels.

B. Related Sections:
   1. Section 09 90 00 - Painting and Coating: Field paint finish.

1.2 REFERENCES

A. ASTM International:

B. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate exact position of access door units.

C. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, and details of adjoining Work.

D. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of access units.
1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified with minimum three years’ experience.

1.6 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work with work requiring controls, valves, traps, dampers, cleanouts, and similar items requiring operation being located behind finished surfaces.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Manufacturers:
   1. J. L. Industries.
   2. Milcor LTD, Partnership.
   3. Nystrom Products Co.
   4. The Bilco Co.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Flush Framed Access Doors (Type 1): Frames and nominal 1 inch wide exposed flanges of 12 gage steel and door panels of 12 gage steel.

C. Gypsum Board Access Doors (Type 2): Frames and nominal 1 inch wide flanges of 16 gage steel and door panels of 14 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09 21 16.

2.2 FABRICATION

A. Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.

B. Wall Access Door and Panel Hardware:
   1. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
   2. Lock: Self-latching lock with key only access.

C. Size Variations: Obtain acceptance of manufacturer’s standard size units which vary slightly from sizes shown or scheduled.

2.3 SHOP FINISHING

A. Base Metal Protection: Prime coat units with baked on primer.

B. Finish: Two coats of field applied paint finish per Section 09 90 00.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
   1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position unit to provide convenient access to concealed work requiring access.

3.3 SCHEDULES

A. Type 1: Install on porcelain tile walls where indicated on Drawings and as required by installation of new for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible porcelain tile surfaces.

B. Type 2: Install on gypsum board surfaces as required by installation of new for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible porcelain tile surfaces.

END OF SECTION
SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes aluminum-framed storefronts including aluminum and glass doors and frames including hardware and glass.

B. Related Sections:
   1. Section 08 71 00 - Door Hardware: Hardware reinforcement requirements affecting framing members; hardware items other than specified in this section.
   2. Section 08 80 00 - Glazing.

1.2 REFERENCES

A. Aluminum Association:

B. American Architectural Manufacturers Association:
   1. AAMA 501 - Methods of Test for Exterior Walls.
   9. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.

C. American Society of Civil Engineers:
D. ASTM International:
3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
11. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

E. National Fenestration Rating Council Incorporated:
1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

F. National Fire Protection Association:

G. SSPC: The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
2. SSPC Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

1.3 SYSTEM DESCRIPTION

A. Aluminum-framed storefront system includes tubular aluminum sections with supplementary internal support framing, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashings, anchorage and attachment devices.

B. System Assembly: Site assembled.
1.4 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
   1. As calculated in accordance with applicable code, as tested in accordance with ASTM E330.
   2. To design pressure of 20 pounds per square foot, as tested in accordance with ASTM E330.

B. Deflection: Limit mullion deflection to 1/175 for spans under 13’-6” and 1/240 plus 1/4 inch for spans over 13’-6”; with full recovery of glazing materials.

C. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

D. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 pounds per square foot as measured in accordance with ASTM E283.

E. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

F. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 pounds per square foot and maximum of 12.00 pounds per square foot.

G. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.69 Btu/sq ft per hour per deg F when measured in accordance with AAMA 1503.

H. Expansion / Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

I. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
D. Design Data: Indicate framing member structural and physical characteristics, calculations, and dimensional limitations.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE


1.7 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum three years experience, and with service facilities within 100 miles of Project.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Handle Products of this section in accordance with AAMA MCWM-1 - Curtain Wall Manual #10.

C. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install sealants nor glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.10 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

1.11 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five-year manufacturer warranty for glazed units.
PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Manufacturers:

1. EFCO Corp.  Products:
   Monett, MO  Exterior Doors: Series D518 Heavy Duty,
   (800)221-4169  Wide Stile Doors with System 403(T)
   Storefront.

2. Kawneer Co., Inc.  Products:
   Norcross, GA  Exterior Doors: 500 Tuffline Series Wide
   Stile Doors with Trifab VG451T Storefront System.

3. YKK AP America, Inc.  Products:
   Dublin, GA  Exterior Doors: Series 50D Wide Stile
   Doors with YES 45TU Thermal Storefront System.
   (314) 304-5182

4. Oldcastle Building Envelope  Products:
   Terrell, TX  Exterior Doors: Rugged WS 500 Series
   Wide Stile Doors with FG-3000 Thermal Storefront System.
   (972) 551-6100

5. Tubelite, Inc.  Products:
   Walker, MI  Exterior Doors: Wide Stile Doors with
   (800) 866-2227  14000 Series Storefront Framing.


B. Product Description:

1. Aluminum Frame: Thermally broken; flush glazing stops; drainage holes;
   internal weep drainage system. Frames for interior glazing need not to be
   thermally broken.

2. Mullions: Profile of extruded aluminum with internal reinforcement of aluminum
   or shaped steel structural section.

3. Doors: Aluminum framed glass doors; 1 3/4 inches thick, nominal 5 inch wide
   top rail and vertical stiles, nominal 10 inch wide bottom rail; square glazing
   stops.

2.2 COMPONENTS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper
   for extruded structural members.

B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.

C. Sheet Steel: ASTM A653; galvanized to minimum G90.

D. Steel Sections: ASTM A36; shaped to suit mullion sections, galvanized to G90.
E. Glass: Specified in Section 08 80 00.

F. Glazing Materials: Storefront manufacturer’s standard types to suit application and to achieve weather, moisture, and air infiltration requirements.

G. Hardware: Furnish manufacturer’s standard door hardware for types of doors and applications indicated, and as specified below.
1. Weather Stripping: Manufacturer’s standard type to suit application, continuous and replaceable.
2. Sill Sweep Strips: Resilient seal type, of neoprene compound.
3. Threshold: Extruded aluminum, one piece for each door opening, ribbed. Specified in Section 08 71 00.
4. Hinges: Continuous, geared type as specified in Section 08 71 00.
5. Exit Device: Surface mount vertical rod device as specified in Section 08 71 00.
6. Closer: Fully adjustable exposed closer as specified in Section 08 71 00.
7. Finish: Exposed hardware to match hardware finishes specified in Section 08 71 00.
8. Lock Cylinders: Specified in Section 08 71 00.

H. Flashings: Minimum 0.032-inch thick aluminum to match mullion sections where exposed.

I. Sealant and Backing Materials:
1. Sealant Used Within System (Not Used for Glazing): Manufacturer’s standard materials to achieve weather, moisture, and air infiltration requirements.
2. Perimeter Sealant: Specified in Section 07 90 00.

J. Fasteners: Stainless steel.

2.3 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Prepare components with internal reinforcement for door hardware.

F. Reinforce framing members for imposed loads.
2.4 SHOP FINISHING

A. Painted Aluminum Surfaces: AA-M12C12R1x non-specular as fabricated mechanical finish, chemically cleaned, and prepared for applied coating; with organic coating.
   1. High Performance Organic Coating: Fluoropolymer coating system complying with AAMA 2604 or 2605 minimum two-coat, with minimum 70 percent polyvinylidene fluoride resin.
   2. Color: As selected by Architect / Engineer from manufacturer’s full range of color selections.

B. Concealed Steel Items: Galvanized to ASTM A123; minimum 2.0 oz/sq ft coating thickness; Grade 85.

C. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

D. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

E. Extent of Finish:
   1. Apply factory coating to surfaces exposed at completed assemblies.
   2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
   3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify dimensions, tolerances, and method of attachment with other Work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.2 INSTALLATION


B. Install head and sill receptors with end dams.

C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

D. Provide alignment attachments and shims to permanently fasten system to building structure.
E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

F. Provide thermal isolation where components penetrate or disrupt building insulation.

G. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form watertight dam.

H. Coordinate attachment and seal of perimeter air and vapor retarder materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Install integral flashings and integral joint sealers.

K. Set thresholds in full bed of mastic and secure.

L. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

M. Coordinate installation of glass with Section 08 80 00; separate glass from metal surfaces.

N. Coordinate installation of perimeter sealants with Section 07 90 00.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 0.06 inches every 3 feet non-cumulative or 1/16 inches per 10 feet, whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting and balancing.

B. Adjust operating hardware and sash for smooth operation.

3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Remove protective material from pre-finished aluminum surfaces.
C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

B. Protect finished Work from damage.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes hardware for wood doors.

B. Related Sections:
   1. Section 08 12 14 - Standard Steel Frames.
   2. Section 08 13 14 – Standard Steel Doors.
   3. Section 08 14 16 - Flush Wood Doors.
   4. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A156.1 - Butts and Hinges.
   2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
   3. ANSI A156.4 - Door Controls - Closures.
   4. ANSI A156.5 - Auxiliary Locks and Associated Products.
   5. ANSI A156.6 - Architectural Door Trim.
   6. ANSI A156.7 - Template Hinge Dimensions.
   7. ANSI A156.8 - Door Controls - Overhead Holders.
   8. ANSI A156.18 - Materials and Finishes
   9. ANSI A156 - Complete Set of 24 BHMA Standards (A156 Series) with Binder.

B. Builders Hardware Manufacturers Association:
   1. BHMA Directory of Certified Products.

C. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, and connection requirements.
   2. Submit manufacturer's parts lists, and templates.

C. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.
D. Keys and Keying:
1. All keying nomenclature shall be prepared using symbols, nomenclature and overall method as described in ASAHC NBHA Handbook – AIA File.
2. Hardware supplier shall provide keying in accordance with instructions of Owner and Architect/Engineer.
3. Before hardware is ordered, a complete keying schematic drawing shall be furnished to Architect/Engineer for approval.
4. All bitting records shall be delivered to Owner for use/reference on future projects.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:
   1. ANSI A156 series.
   2. NFPA 80.
   3. UL 305.

B. Furnish hardware marked and listed in BHMA Directory of Certified Products.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years experience.

B. Hardware Supplier: Company specializing in supplying commercial and institutional door hardware with minimum ten years documented experience.

C. Hardware Supplier Personnel: Employ Architectural Hardware Consultant (AHC) to assist in work of this section.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

C. Include persons involved with installation of doors, frames, and hardware.
1.8 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
   B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.9 COORDINATION
   A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
   B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
      1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
   C. Sequence installation to accommodate required utility connections.
   D. Coordinate Owner's keying requirements during course of Work.

1.10 WARRANTY
   A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
   B. Furnish five year manufacturer warranty for locksets and door closers.

1.11 MAINTENANCE MATERIALS
   A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance materials.
   B. Furnish special wrenches, tools, and accessories applicable for each different and for each special hardware component supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.1 DOOR HARDWARE
   A. Manufacturers: Catalog numbers of manufacturers listed have been used to establish quality required. Only manufacturers listed in Paragraph B below are approved. Other manufacturers seeking approval shall do so in writing per General Requirements and shall list exact catalog numbers and description of items he proposes to furnish; include reference to this specification section for equal product reference; include cut sheets.
B. Designations: Following abbreviations identify listed manufacturers.
   1. BAL Baldwin Hardware Mfg. Corp., Reading, PA.
   2. BES Best Access Systems, Indianapolis, IN.
   3. COR Corbin-Russwin Architectural Hardware, Berlin, CT.
   4. DOR Dorma Architectural Hardware, Reamstown, PA.
   5. GJ Glynn-Johnson, Div. of Dayton-Walter Corp, Chicago, IL.
   6. HAG Hager Hinge Co., St. Louis, MO.
   7. HOR Horton Automatics, Corpus Christi, TX.
   8. IVE Ives, Div. of Leigh Products, New Haven, CT.
   9. LAW Lawrence Brothers, Inc., Sterling, IL.
   10. LCN LCN Closer, Princeton, IL.
   11. MCK McKinney Products Co., Scranton, PA.
   12. NAT National Guard Products, Memphis, TN.
   13. NOR Norton Door Controls, Charlotte, NC.
   14. PEM Pemko, Ventura, CA.
   15. RED Reed Exit Hardware, Charlotte, NC.
   16. REE Reese Enterprises, Inc., Rosemount, MN.
   17. RIX Rixson-Firemark, Franklin Park, IL.
   18. ROC Rockwood Manufacturing Co., Rockwood, PA.
   19. SAR Sargent, Div. of Kidde, New Haven, CT.
   20. SCH Schlage Lock Co., Palatine, IL.
   21. STA Stanley Hardware, New Britain, CT.
   22. VON Von DuPrin, Indianapolis, IN.

2.2 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
   1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
   2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
   3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
   4. Finish: Match hardware item being fastened.

B. Hinges: Continuous hinge, manufactured of 6063-T6 aluminum.
   1. Components: Two interlocking geared leaves and a cover channel applied the full length of the door without mortising (concealed).
      a. Ensure separation of different metals to avoid galvanic corrosion.

   1. Bored (Cylindrical) Locksets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
   2. Auxiliary Locksets: ANSI A156.5, Grade 1, mortise dead locks unless otherwise indicated.
D. Exit Devices: ANSI A156.3, Grade 1 surface mounted vertical rod type and rim type, with push pad, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
   1. Types: Suitable for doors requiring exit devices.
   2. Coordinators: Furnish overhead concealed in frame type at pairs of doors.
   3. All exit devices shall be UL listed for panic. Exit devices for labeled doors shall be UL listed as “Fire Exit Hardware”.
   4. Provide exit devices factory cut to door width and height. Locate exit devices at a height recommended by the exit device manufacturer, allowable by governing building codes, and approved by the Architect/Engineer.
   5. Provide weatherseal gasketing at exterior applications.
   6. Provide cylinder-dogging feature for exit devices as indicated (hex key only).
   7. Provide keyed removable mullions, as specified in the Hardware Groups.
   8. Provide and install Schlage 20-079 IC Housing and Schlage 23-030 Conventional cores keyed to Owner’s master key system for all exterior doors. No substitutions. Ensure all other temporary or permanent hardware is compatible.
   9. Provide and install Schlage 20-079 IC Housing and Schlage 23-030 Conventional cores keyed to Owner’s master key system for all interior exit devices. No substitutions. Ensure all other temporary or permanent hardware is compatible.

E. Cylinders: ANSI A156.5, Graded 1, 6 pin type cylinders.
   1. Keying: Keyed as directed by Owner.
   2. Include construction keying for contractor access prior to substantial completion.
   4. Supply keys in the following minimum quantities:
      a. 6 master keys.
      b. 3 grand master keys.
      c. 3 great grand master keys.
      d. 10 construction keys.
      e. 5 control keys.

F. Closers: ANSI A156.4 modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
   1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
   2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
   3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
   4. Operating Pressure: Maximum operating pressure as follows.
      a. Interior Doors: Maximum 5 pounds.

G. Manual and Automatic Bolts, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
   1. Manual and Automatic Bolts: ANSI A156.16 Grade 1 top and bottom flush bolts, with dust-proof floor strike, unless otherwise indicated.
   2. Kickplates: ANSI A156.6, metal; height indicated in Schedule by 2 inch less than door width; minimum 0.050 inch thick stainless steel.
   3. Wall Stops: ANSI A156.1, Grade 1, concave pad wall stop with no visible screws.
2.3 ACCESSORIES

A. Lock Trim: Furnish levers as indicated in Schedule.
   1. Do not permit through bolts on solid wood core doors.

B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.
   1. Do not use through bolts on solid wood core doors.

2.4 FINISHING

A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
   1. Typical Exterior Exposed and High Use Interior Door Hardware:
      a. BHMA 630, satin finished stainless steel.
      b. BHMA 626, satin chromium plated brass or bronze.
   2. Typical Interior Door hardware:
      a. BHMA 626, satin chromium plated brass or bronze.
      b. BHMA 630, satin finished stainless steel.
   3. Closers: Finish appearance to match door hardware on same face of door.
      a. BHMA 628, satin aluminum, clear anodized.
   4. Thresholds: Finish appearance to match door hardware on exterior face of door.
      a. BHMA 628, satin aluminum, clear anodized.
      b. BHMA 630, satin finished stainless steel.
   5. Other Items: Furnish manufacturer’s standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

2.5 PRODUCTS

A. Hinges:
   1. Hinges: Continuous, geared aluminum, heavy duty, concealed left 180 degree opening, two-coat flouropolymer coating system in custom color at exterior hollow metal doors and aluminum storefront doors, clear anodized at interior doors.
      a. Manufacturers:
         1) HAG – 780-112HD.
         2) MCK – 12 HD.
         3) PEM – CFM83 SLFHD.

B. Closers:
      a. Manufacturer:
         1) LCN – 4041 Series.
         2) COR – DC8200 Series.
         3) SAR – 281-P Series.
2. Closer: Universal, non-handed, parallel arm with built-in cushioned stop.
a. Manufacturer:
   1) LCN – 4041 Series with Spring Cush Arm.
   2) COR – DC8200 X A11 Series.
   3) SAR – 281-CPS Series.

3. Closer: Universal, non-handed, parallel arm with hold-open function.
a. Manufacturer:
   1) LCN – 4041-3049 Series.
   2) COR – DC8200 X A12 Series.
   3) SAR – 281-PH10 Series.

a. Manufacturer:
   1) LCN – 4041-3049 SC Series.
   2) COR – DC8200 X A12 Series.
   3) SAR – 281-CPSH Series.

C. Cylinders:
1. Cylinder, 6 pin.
a. Manufacturer: Schlage C Keyway.
   1) Provide and install housing, cylinders and cores keyed to Owner’s master key system on all doors.

D. Exit Devices: (Lockset manufacturer shall provide cylinders for exit devices).
a. Manufacturer:
   1) VON – 99L-F.
   2) COR – ED5200A X N9.
   3) SAR – 12-8810 X ETL.

2. Fire rated, touch bar, surface mounted, vertical rod, lever handle, interchangeable core, dustproof flush floor strike, extension rods as required, US26D X US32D push bar.
a. Manufacturer:
   1) VON – 9927L-F.
   2) COR – ED5400A X N9.
   3) SAR – 12-8713 X ETL.

E. Gasket:
1. Meeting Stile: Surface mount.
a. Manufacturers:
   1) NAT 137SA.
   2) PEM 303AS.

F. Kickplates:
1. Kickplate: Stainless steel, 0.050 inch thick, beveled three sides, 12 inches high x 2 inches less door width.
a. Manufacturer:
   1) IVE – 8400 Series.
   2) HAG – 193S Series.
G. Locksets:
   1. Lockset: Cylindrical, heavy duty, entrance / office lock (F82).
      a. Manufacturers:
         1) SCH – ND 50 PD – RHO.
         2) COR – CL3300 series equal to SCH.
         3) SAR – 10-Line series equal to SCH.
         4) YAL – 5400LN series equal to SCH.

H. Push / Pull:
   1. Wrought, 0.050 inches thick, beveled edges, pull cast.
      a. Manufacturers:
         1) BAL – 2123 push x 2365 push/pull.
         2) IVE – 8200 3.5 x 15 push; 8200 x 15 x 8102-8 push/pull.
         3) ROC – 70B push x 107 x 70B push/pull.

I. Stops:
   1. Door Stop: Wall mount.
      a. Manufacturer:
         1) BAL – 4290 Series.
         2) GJ – 60W.
         3) IVE – Approved equal.
         4) SAR – Approved equal.

J. Thresholds:
   1. Flat saddle, aluminum, 6 inches x ½ inch.
      a. Manufacturer:
         1) NAT – 426.
         2) PEM – 172A
         3) REE – S206A.

K. Weatherstrip:
   1. Doorframe: Head and jamb, surface mount.
      a. Manufacturer:
         1) NAT – 130NA.
         2) PEM – 315CR
         3) REE – DS 78A.
   2. Door Bottom: Sill protection.
      a. Manufacturer:
         1) NAT – 200NA.
         2) PEM – 315CN
         3) REE – 323A.
   3. Door Top: Drip strip, frame mount.
      a. Manufacturer:
         1) NAT – 16AD.
         2) PEM – 346C
         3) REE – R201A.
PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

B. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
   1. Push/Pulls: 42 inch.
   2. Dead Locks: 48 inch.

3.3 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution Requirements: Testing, adjusting, and balancing.

B. Architectural Hardware Consultant inspect installation and certify hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

A. Section 01 70 00 - Execution Requirements: Testing, adjusting, and balancing.

B. Adjust hardware for smooth operation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution Requirements: Protecting installed construction.

B. Do not permit adjacent work to damage hardware or hardware finish.

3.6 SCHEDULES

A. The following hardware sets are intended to establish type and standard of quality when used together with these section requirements. Equal products from other manufacturers approved in Part 2 are acceptable. Equal products shall be compatible with all other components of hardware sets (including items indicated “No Substitutions”), and Owner’s specified cylinder, core and keying system. Examine Drawings and Specifications and furnish proper hardware for door openings.
B. Where a pair of doors is installed, items listed are per leaf, except locks where inactive door is listed.

1. Group 1:
   a. Wirth Doors 7-9 and 7-10 (multiple user toilet rooms).
      1) Hinge: #1.
      2) Closer: #3.
      3) Kickplate: #1.
      4) Push / Pull: #1.
      5) Stop: #1.

2. Group 2:
   a. Wirth Doors 5G and 5B (multiple user toilet rooms).
      1) Hinge: #1.
      2) Closer: #3.
      3) Kickplate: #1.
      4) Push / Pull: #1.
      5) Stop: #1.
      6) Salvage and reinstall existing dead lock.

3. Group 3:
   a. Lalumier Doors 001 and 002 (exterior double storefront doors).
      1) Hinge: #1.
      2) Closer: #2.
      3) Exit Device: #2 (with hex key dogging).
      4) Gasket: #1.
      5) Threshold: #1.
      6) Weatherstrip: As per Section 08 41 13.

4. Group 4:
   a. Lalumier Doors 101 through 118 (classroom doors).
   b. E. Morris Doors D and 1 through 18 (classroom doors).
   c. Huffman Doors C-1, 24 and 1 through 19 (classroom doors).
      1) Hinge: #1.
      2) Closer: #2.
      3) Kickplate: #1.
      4) Lockset: #1.

5. Group 5:
      1) Hinge: #1.
      2) Closer: #4.
      3) Push / Pull: #1.
      4) Threshold: #1.
      5) Weatherstrip: #1, #2 and #3.
      6) Salvage and reinstall existing dead lock, alarm contact, and kick down hold open.
6. Group 6: 
a. Penniman Door 17 (exterior hollow metal door).
   1) Hinge: #1.
   2) Closer: #2.
   3) Exit Device: #1.
   4) Threshold: #1.
   5) Weatherstrip: #1, #2 and #3.

7. Group 7: 
   1) Hinge: #1.
   2) Closer: #2.
   3) Exit Device: #2 (with hex key dogging).
   4) Gasket: #1.
   5) Stop: #1.
   6) Threshold: #1.
   7) Weatherstrip: #1 and #2.

8. Group 8: 
   1) Hinge: #1.
   2) Closer: #2.
   3) Push / Pull: #1.
   4) Stop: #1.

9. Group 9: 
   1) Hinge: #1.
   2) Closer: #2.
   3) Exit Device: #1 (with hex key dogging).
   4) Threshold: #1.
   5) Weatherstrip: #1, #2 and #3.

   END OF SECTION
SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes glass glazing, rated and non-rated for hollow metal doors, flush wood doors and aluminum storefronts.

B. Related Sections:
   1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants.
   2. Section 08 13 14 - Standard Steel Doors: Glazed doors.
   3. Section 08 14 16 - Flush Wood Doors: Glazed doors.
   4. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts.

1.2 REFERENCES

A. American National Standards Institute:

B. American Society of Civil Engineers:

C. ASTM International:

D. Consumer Products Safety Commission:
E. Glass Association of North America:
   1. GANA - Sealant Manual.

F. National Fire Protection Association:

G. Underwriters Laboratories Inc.:
   1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
   2. UL - Building Materials Directory.

1.3 PERFORMANCE REQUIREMENTS

A. Interior Glass Deflection: Design glass partition system to withstand live loads in accordance with 2009 International Building Code with maximum L/120 deflection.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements.
   2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify full range of available colors where exposed.

C. Design Data:
   1. Submit design calculations for glass resisting wind loads and live loads signed and sealed by a professional engineer licensed in the State of Missouri.

D. Samples:
   1. Glass: Submit two samples 12 x 12 inch in size, illustrating each glass units, coloration and design.
   2. Glazing Materials: Submit 12 inch long bead of glazing sealant and gaskets, color as selected.

E. Manufacturer's Certificate: Certify sealed insulating glass, meets or exceeds specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual for glazing installation methods.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years experience.
1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install glazing when ambient temperature is less than 50 degrees F.

C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish ten year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS

2.1 GLAZING

A. Manufacturers:
   1. PPG Industries, Inc.
   2. Pilkington LOF.
   3. Nippon Electric Glass Company, Ltd.
   4. SAFTI FIRST Fire Rated Glazing Solutions.
   5. Substitutions: Section 01 60 00 – Product Requirements.

2.2 COMPONENTS

A. Safety Glass (Type SG): CPSC 16 CFR 1201 Category II, minimum thickness 1/4 inch unless otherwise indicated. Safety glass shall be labeled and label shall be visible after glazing.
   1. Clear Tempered Glass (Type SG-CT): ASTM C1048, Kind FT Fully tempered, Condition A, uncoated, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select; with horizontal tempering and Low E coating.
   2. Tinted Tempered Glass (Type SG-TT): ASTM C1048, Kind FT Fully tempered, Condition C, Type 1 transparent flat, Class 2 tinted heat-absorbing and light reducing, Quality q3 glazing select.
      a. Tint: Gray.

B. Fire Resistive Ceramic Glass: Transparent polished both surfaces conforming to NFPA 252 and ANSI Z97.1. Fire protective glass shall be permanently labeled and label shall remain visible after glazing.
   1. Clear fire resistive ceramic glass (FRG-CC).
   2. Thickness: Manufacturer’s standard.
   3. Fire Rating: 20 and 60 minute rating as listed in UL Building Materials Directory and approved by authority having jurisdiction for applications indicated.
C. Insulated Glass Units (Type IG-1): Total unit thickness 1 inch.
   1. Double Pane Insulated Glass Units: ASTM E774 Class A and E773; with silicone sealant edge seal; purge interpane space with dry hermetic air.
      a. Outer Pane: Glass Type: SG-TT.
      b. Inner Pane: Glass Type SG-CT with Low E coating on third glass surface form building exterior.
      c. Visible Light Transmission: 25 to 40 percent.
      d. Shading Coefficient: 0.45 to 0.55.
      e. Solar Heat Gain Coefficient: 0.40 to 0.45.
   2. Insulated Glass Unit Edge Seal Construction: Aluminum mitered and spigoted corners.

2.3 ACCESSORIES

A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, insulating glass seals, and glazing channels.
   1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25.
      a. Acceptable Manufacturers and products:
         1) General Electric – “Silpruf”.
         2) General Electric – “Silglaze 2400”.
         3) Woodmount Products – “Chem-Caulk 1000”.
         4) Dow Corning – “790”.
         5) Pecora – “863”.
      b. Color: As selected by Architect / Engineer.
      c. Structural Silicone: Furnish high-modulus structural silicone glazing materials where sealant bonds glass to substrate.

B. Glazing Gaskets: ASTM C864 Option I or II, resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot.

C. Pre-Formed Glazing Tape: Size to suit application.
   1. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal.

D. Setting Blocks: ASTM C864 Option I, Neoprene, 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

E. Spacer Shims: ASTM C864 Option I, Neoprene, 50 to 60 Shore A durometer hardness, minimum 3 inch long x one half the height of glazing stop x thickness to suit application, self adhesive on one face.

F. Fire-Resistant Glazing Materials: Materials used to obtain required fire-resistant rating.
PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Verify openings for glazing are correctly sized and within acceptable tolerance.
C. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.
B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
C. Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

A. Perform installation in accordance with GANA Glazing Manual.
   2. Fire Rated Openings: Comply with NFPA 80.
B. Interior Wet/Dry Method (Tape and Sealant) Installation:
   1. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.
   2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
   3. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
   4. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
   5. Fill gaps between pane and applied stop with elastomeric glazing sealant to depth equal to bite on glazing, to uniform and level line.
   6. Trim protruding tape edge.
C. Interior Wet Method (Compound and Compound) Installation:
   1. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24-inch centers, kept 1/4 inch below sight line.
   2. Locate and secure glazing pane using glazers’ clips.
   3. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.4 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
B. Monitor quality of glazing.
3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
B. Remove glazing materials from finish surfaces.
C. Remove labels after Work is complete.
D. Clean glass and adjacent surfaces.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
B. After installation, mark pane with an 'X' by using removable plastic tape or paste.

3.7 SCHEDULE

A. Exterior Glazing: Type IG-1, wet/dry method with silicone glazing sealant.
B. Interior Non-Fire Rated Doors and Aluminum storefronts: Type SG-CT, interior wet method with paintable polyurethane glazing sealant.
C. Interior Fire Rated Doors: Type FRG-CC for 20 minute and 60 minute rating as indicated on Drawings.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal stud wall framing.
   2. Metal channel wall furring.

B. Related Requirements:
   1. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood blocking.

1.2 REFERENCE STANDARDS

A. ASTM International:
   5. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

B. Gypsum Association:
   1. GA 214 - Recommended Levels of Gypsum Board Finish.
   2. GA 216 - Application and Finishing of Gypsum Board.

C. Underwriters Laboratories, Inc.:

D. National Fire Protection Association:
   1. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls, Method B.
1.3 SUBMITTALS
   A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
   B. Product Data: Submit data on metal framing, gypsum board, joint tape, and accessories.

1.4 QUALITY ASSURANCE
   A. Perform Work in accordance with ASTM C840, ASTM C1280, GA-214, GA-216 and GA-600.

1.5 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
   B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES
   A. Manufacturers:
      1. CertainTeed.
      2. Georgia-Pacific.
      4. United States Gypsum Co.
      5. No substitutions permitted.
   B. Performance / Design Criteria:
      1. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated according to ASCE 7 and applicable codes.

2.2 COMPONENTS
   A. Framing Materials:
      1. Studs and Tracks: ASTM C645; GA-216 and GA-600; galvanized sheet steel, 20 gauge minimum, unless indicated otherwise on Drawings; C-shape, of depth as shown on Drawings.
      2. Fasteners: ASTM C1002 and GA-216 screws; length to suit application.
      3. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
B. Gypsum Board Materials: ASTM C1396.

1. Fire Rated Gypsum Board: ASTM C36; fire resistive type, UL or WH rated; 5/8-inch thick, maximum available length in place; ends square cut, tapered edges.

2. Fire-Rated Abuse-Resistant Gypsum Board: (Install to height of 8 feet above floor level with standard Type X above). A gypsum core wall panel with additives to enhance fire resistance, surface indentation resistance, and impact resistance of the core and surfaced with abrasion resistant paper on front and long edges with heavy liner paper bonded to the back side; and complying with ASTM C 36 / C 1396, Type X.
   b. Width: 4 ft.
   c. Length: 8 ft. through 12 ft.
   d. Edges: Tapered.
   e. Impact Resistance: No failure after 100 impacts.
   f. Indentation Resistance: Not less than the following loads to produce the indicated depth of surface indentation when tested in accordance with ASTM D 1037, modified:
      1) 0.100 in.: 232 lbs.
      2) 0.200 in.: 469 lbs.
   g. 3M Surface Abrasion Resistance: Not greater than the following depths when tested using the indicated number of cycles in accordance with ASTM D 4977, modified:
      1) 50: 0.001 in.
      2) 250: 0.001 in.
      3) 500: 0.002 in.
      4) 1000: 0.003 in.
   h. Taber Surface Abrasion Resistance: Not greater than the following depths when tested using the indicated number of cycles in accordance with ASTM D 4060, modified:
      1) 25: 0.002 in.
      2) 50: 0.004 in.
      3) 75: 0.005 in.
      4) 100: 0.007 in.
      5) 125: 0.008 in.
      6) 150: 0.010 in.
   i. Impact/Penetration Resistance Rating: Not less than 60 ft.-lbs. when tested in accordance with ASTM D 2394, modified.

3. Moisture Resistant Gypsum Board: ASTM C630; 5/8-inch thick, maximum available length in place; ends square cut, tapered edges.

4. Tile Backer Boards: As specified in Section 09 30 00.
2.3 ACCESSORIES

A. Gypsum Board Accessories: ASTM C1047; metal, metal and paper combination or plastic; corner beads, edge trim, and expansion joints.
   1. Metal Accessories: Galvanized steel, Aluminum coated steel or Zinc.
   2. Plastic Accessories: PVC plastic or ABS plastic.

B. Joint Materials: ASTM C475 and GA-216; reinforcing tape, joint compound, and water.

C. Gypsum Board Screws: ASTM C954 and ASTM C1002; length to suit application.
   1. Screws for Steel Framing: Type S.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify site conditions are ready to receive work.

3.2 DEMOLITION

A. Extend existing gypsum board installations using materials and methods as specified.

B. Repair and remodel existing gypsum board assemblies which remain or are to be altered.

3.3 INSTALLATION

A. Metal Stud Installation:
   1. Install studs in accordance with ASTM C754, ASTM C1007, GA-216 and GA-600.
   2. Metal Stud Spacing: As indicated on Drawings.
   3. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
   4. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.
   5. Blocking: Nail wood blocking to studs. Install blocking for support of toilet accessories and toilet partitions.

B. Gypsum Board Installation:
   1. Install gypsum board in accordance with ASTM C840, GA-216, and GA-600.
   2. Erect single layer of gypsum board in most economical direction, with ends and edges occurring over firm bearing.
   3. Use screws when fastening gypsum board to metal furring or framing.
   4. Treat cut edges and holes in moisture resistant gypsum board with sealant.
5. Place control joints consistent with lines of building spaces at maximum of 12 feet on center, at above both sides of openings.
6. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

C. Cementitious Backer Board Installation:
1. Install in accordance with ANSI A108.11 and board manufacturer’s installation instructions.
2. Tape joints and corners, cover with skim coat of dry-set mortar to feather edge.

D. Joint Treatment:
1. Tape, fill and sand exposed joints, edges and corners to produce smooth surface ready to receive finishes.
2. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
3. Finish in accordance with GA-214 Level as specified.

3.4 TOLERANCES
A. Section 01 40 00 - Quality Requirements: Tolerances.
B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet.

3.5 SCHEDULE
A. Finishes in accordance with GA-214 Level:
1. Level 1: Above finished ceilings concealed from view.
2. Level 5: Walls exposed to view.
3. Level 5: Ceilings exposed to view.

END OF SECTION
SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ceramic porcelain tile for floor and wall applications; cementitious backer board as tile substrate; and accessories.

B. Related Sections:
   1. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A108.1 - Installation of Ceramic Tile, A collection.
   2. ANSI A108.1A - Specifications for Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
   5. ANSI A108.4 - Specifications for Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
   6. ANSI A108.5 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
   7. ANSI A108.6 - Specifications for Ceramic Tile Installed with Chemical-Resistant, Water-Cleanable Tile-Setting and -Grouting Epoxy.
   8. ANSI A108.7 - Specifications for Electrically Conductive Ceramic Tile Installed with Conductive Dry-Set Portland Cement Mortar.
   9. ANSI A108.8 - Specifications for Ceramic Tile Installed with Chemical-Resistant Furan Mortar and Grout.
  10. ANSI A108.9 - Specifications for Ceramic Tile Installed with Modified Epoxy Emulsion Mortar/Grout.
  13. ANSI A118.3 - Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.
  14. ANSI A118.4 - Latex-Portland Cement Mortar.
  15. ANSI A118.5 - Chemical-Resistant Furan Mortar and Grout.
  16. ANSI A118.6 - Ceramic Tile Grouts.
  17. ANSI A118.8 - Modified Epoxy Emulsion Mortar/Grout.
  18. ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.
  20. ANSI A137.1 - Ceramic Tile.
B. Tile Council of America:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, and setting details.
C. Product Data: Submit instructions for using grouts and adhesives.
D. Samples for Initial Selection: Submit minimum 2 by 6 inch physical sample of each color selection in manufacturer’s full line of standard colors for product specified.
E. Samples for Verification: Submit a maximum of 3 full size pieces of each field tile, accent tile and base tile selected by Architect/Engineer. No assembled samples will be required.
F. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
B. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
B. Installer: Company specializing in performing Work of this section with minimum three years documented experience and approved by tile manufacturer.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
B. Protect adhesives and grouts from freezing or overheating.
1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install adhesives and grouts in unventilated environment.

C. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.10 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Supply 20 square feet of wall field tile, 20 square feet of floor field tile, 10 square feet of each accent tile and 5 pieces of base tile.

PART 2 - PRODUCTS

2.1 TILE

A. Manufacturers:
   1. Daltile:
      a. Field Tile: Portfolio Colorbody Porcelain Floor and Wall Tile, color as selected by Architect/Engineer from manufacturer’s full range of standard colors.
      b. Accent Tile: Portfolio Vivid Colorbody Porcelain Floor and Wall Tile, Generation Z Yellow, Electric Blue, Crimson Red, Plum Crazy or Charcoal (Portfolio PF09) as indicated on Drawings.
      c. Field tile for walls and field tile for floors may be of different color selections. Field tile selections may vary per building.

2. No substitutions.

2.2 COMPONENTS

A. Ceramic and Porcelain Floor and Wall Tile: ANSI A137.1, conforming to the following:
   1. Water Absorption: ASTM C373 - <0.5%.
   5. Abrasion Resistance; ASTM C1027 - N/A.
   7. Shape: Rectangular.
   8. Edge: Square, Cushioned.
B. Base: Same as field tile. Match floor and wall tile for performance characteristics, surface finish, and color:
1. Length: 12 inch.
2. Height: 6 inch.
3. Top Edge: Square.
4. Internal Corner: Mitered.
5. External Corner: Cover base out corner.

2.3 ACCESSORIES

A. Tile Edging:
   Tel.: (800) 472-4588. Fax: (800) 477-9783. E-mail: specassist@schluter.com.
2. Material and Finish: Stainless steel in color and finish as selected by Architect/Engineer from manufacturer’s full line of color selection.
3. Profiles: Outside corner and other profiles required.
4. Mounting: Concealed flange to be mortared into wall construction behind tile.
5. Corner Construction: Square or radius.
6. Thickness: To match specified tile.
7. Accessories: Connectors, in-corners and out-corners as necessary.

B. Adhesive Materials:

C. Mortar Materials:
2. Mortar Bond Coat Materials:
   b. Latex-Portland Cement type: ANSI A118.4.

D. Grout Materials:
   a. Color: As selected by Architect/Engineer from full range of manufacturer’s standard colors.
2. Silicone Rubber Grout: Silicone sealant, moisture and mildew resistant type, complying with ANSI A118.6, color as selected by Architect/Engineer from full range of manufacturer’s standard colors; use for toilet room, floors and walls.
   a. Grout Sealer: Clear penetrating silicone resin water repellent for Portland cement grout.
   b. Silicone sealant to be installed in movement joints and junction of tile and dissimilar materials and junction of dissimilar plans as recommended by tile manufacturer. Movement joints shall also be installed at perimeter of tile areas and as indicated on Drawings. Color to match adjacent cement grout.

E. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Verify surfaces are ready to receive work.

3.2 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 cementitious backer board. Tape joints and corners, cover with skim coat of dry-set mortar to feather edge.
E. Prepare substrate surfaces for adhesive installation.

3.3 INSTALLATION
A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook recommendations.
B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
C. Place edge strips at exposed tile edges and locations indicated.
D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base and wall joints.
E. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
F. Form internal angles square and external angles with Schluter only 1T strips.
G. Install ceramic accessories rigidly in prepared openings.
H. Install base tiles with sanitary cove flush with floor tiles.
I. Sound tile after setting. Replace hollow sounding units.
J. Keep expansion and control joints free of adhesive or grout. Apply sealant to joints.
K. Allow tile to set for a minimum of 48 hours prior to grouting.
L. Grout tile joints. Use standard grout unless otherwise indicated.

M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

N. Installation - Floors - Thin-Set Methods:
   1. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

   O. Installation - Floors - Mortar Bed Methods:
   1. Over interior concrete substrates, install in accordance with TCA Handbook Method F111, with cleavage membrane, unless otherwise indicated.
   2. Cleavage Membrane: Lap and seal watertight, edges and ends.
   3. Mortar Bed Thickness: As dictated by existing conditions.

P. Installation - Wall Tile:
   1. Over cementitious backer units install in accordance with TCA Handbook Method W244, using membrane at toilet rooms.
   2. Over plaster install in accordance with TCA Handbook Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.4 CLEANING
   A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
   B. Clean tile and grout surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION
   A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
   B. Cover floors with kraft paper and protect from dirt and residue from other trades.
   C. Where floors will be exposed for prolonged periods, cover with plywood or similar walkway protection.
   D. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION
SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

1. GENERAL

1.1 SUMMARY

A. Section includes suspended metal grid ceiling system, perimeter trim, acoustic panels, and accessories.

B. Related Requirements:
   1. Section 07 90 00 - Joint Protection.
   2. Division 26 – Interior Lighting.

1.2 REFERENCE STANDARDS

A. ASTM International:
   6. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

B. Ceilings and Interior Systems Construction Association:
   1. CISCA - Acoustical Ceilings: Use and Practice.

C. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

D. National Fire Protection Association:

E. Underwriters Laboratories Inc.:
   1. UL - Fire Resistance Directory.

1.3 PERFORMANCE REQUIREMENTS

A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1:240.
1.4 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on metal grid system components and acoustic units.

C. Shop Drawings:
   1. Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system. Indicate method of suspension where interference exists. Indicate installation details required for seismic design loads.

D. Samples:
   1. Submit two samples 4 x 4 inch in size illustrating material and finish of acoustic units in all standard colors available from the manufacturer.
   2. Submit two samples each, 12 inches long, of suspension system main runner in all standard colors available from the manufacturer.

E. Manufacturer's Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Conform to CISCA requirements.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum three years’ experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements.

B. Maintain uniform temperature of minimum 55 degrees F, and maximum humidity of 65 to 70 percent prior to, during, and after acoustic unit installation.

1.8 SEQUENCING

A. Section 01 10 00 – Summary: Requirements for sequencing.

B. Sequence Work to ensure acoustic 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.

C. Install acoustic units after interior wet work is dry.
2. **PRODUCTS**

2.1 **SUSPENDED ACOUSTICAL CEILINGS**

A. Manufacturers:
   1. USG Interiors: Fifth Avenue.
   2. No substitutions.

2.2 **COMPONENTS**

A. Acoustic Panels: ASTM E1264, conforming to the following:
   1. Size: 24 x 24 inches.
   2. Thickness: 5/8 inches.
   4. NRC Range: 0.55.
   5. Sound Attenuations (CAC): 33.
   6. Light Reflectance: 0.82.
   7. Edge: Square.

B. Grid:
   1. Non-fire Rated Grid: ASTM C635, Heavy Duty; exposed T components die cut and interlocking.
      USG: Donn DX.
   2. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
      a. Exposed Grid Surface Width: As per applicable code for seismic design category indicated on Drawings.
   3. Grid Finish: Color to match selected tiles.
   4. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and hold down clips, as required for suspended grid system.
   5. Support Channels and Hangers: Galvanized Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

2.3 **ACCESSORIES**

A. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.

B. Touch-up Paint: Type and color to match acoustic and grid units.

C. Seismic Bracing: As required to meet seismic performance requirements.
3. EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for installation examination.

B. Verify layout of hangers will not interfere with other work.

3.2 INSTALLATION

A. Lay-In Grid Suspension System:
   1. Install suspension system in accordance with ASTM C636 and as supplemented in this section.
   2. Install suspension system in accordance with ASTM E580.
   3. Install system capable of supporting imposed loads with maximum deflection of 1/240 maximum.
   4. Locate system on room axis according to reflected plan.
   5. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
   6. Install hanger clips during steel deck erection. Install additional hangers and inserts as required.
   7. 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.
   8. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
   9. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
  10. Do not eccentrically load system, or produce rotation of runners.
  11. Perimeter Molding:
      Install edge molding at intersection of ceiling and vertical surfaces with continuous gasket. Use longest practical lengths.
      Miter corners.
      Install at junctions with other interruptions.
   12. Install light fixture boxes constructed of acoustic panel above light fixtures in accordance with UL assembly requirements and light fixture ventilation requirements.
   13. Laterally brace entire suspended system as required for seismic design category as indicated on Drawings.

B. Acoustic Units:
   1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
   2. Install units after above ceiling work is complete.
   3. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
   4. Cutting Acoustic Units:
      Cut to fit irregular grid and perimeter edge trim.
      Cut square reveal edges to field cut units.
5. Where bull-nosed concrete block corners and round obstructions occur, install preformed closures to match perimeter molding.
6. Install hold-down clips to retain panels tight to grid system in a continuous band at least 7’-0” wide from plumbing wall over toilet compartments and within 20 feet of exterior door.

3.3 TOLERANCES

A. Section 01 40 00 – Quality Requirements: Tolerances.

B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes resilient tile flooring and resilient base.

1.2 REFERENCES

A. ASTM International:

B. Federal Specification Unit:
   1. FS L-F-475 - Floor Covering Vinyl, Surface (Tile and Roll), with Backing.
   2. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant.

C. National Fire Protection Association:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate seaming plan, custom patterns and inlay designs.

C. Product Data: Submit data describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

D. Samples:
   1. Submit manufacturer's complete set of color samples for initial selection.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect roll materials from damage by storing on end.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

C. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.8 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish 40 square feet of flooring and 20 linear feet of base of each type and color specified.

PART 2 - PRODUCTS

2.1 TILE FLOORING

A. Manufacturers:

1. Armstrong World Industries; Excelon.
2. Mannington Commercial; Essentials.
3. Johnsonite / Tarkett; Azrock Collection.
4. Substitutions: Section 01 60 00 – Product Requirements.

B. Vinyl Composition Tile: ASTM F1066:

1. Size: 12 x 12 inch.
2. Thickness: 0.125 inch.
4. Color: As selected by Architect / Engineer from manufacturer’s full range of color selections.
2.2 RESILIENT BASE

A. Manufacturers:
   1. Armstrong.
   2. Flexco.
   3. Johnsonite Inc.
   4. Roppe Corp.
   5. Inpro.

B. Base: ASTM F1861 Type TS – Vulcanized rubber, coved style:
   1. Height: 4 inch.
   2. Thickness: 0.125 inch thick.
   3. Finish: Matte.
   4. Length: Roll.
   5. Accessories: Premolded external corners and end stops.
   6. Color: As selected by Architect / Engineer from manufacturer’s full range of color selections.

2.3 ACCESSORIES

A. Subfloor Filler: Cementitious or premix latex; type recommended by adhesive material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

C. Moldings and Edge Strips: Same material as flooring or metal.

D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify floor and lower wall surfaces are free of substances capable of impairing adhesion of new adhesive and finish materials.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.
C. Clean substrate.

D. Apply primer as required to prevent "bleed-thru" or interference with adhesion by substances cannot be removed.

3.3 EXISTING WORK

A. Extend existing resilient flooring installations using materials and methods compatible with existing installations, or as specified.

3.4 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

C. Install tile to basket weave pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

D. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

E. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

F. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Secure metal strips before installation of flooring with stainless steel screws.

3.5 INSTALLATION - BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.6 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Remove excess adhesive from floor, base, and wall surfaces without damage.

C. Clean, seal, and maintain resilient flooring products.
3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

B. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION
SECTION 09 67 00 - FLUID-APPLIED FLOORING (ALTERNATE BID #1)

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fluid-applied high-density epoxy flooring and base; divider strips and accessories; as shown on Drawings, schedules and specified herein.

B. Related Sections:
   1. Section 07 90 00 - Joint Protection: Joint between base and wall surface.

1.2 REFERENCES

A. ASTM International:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

C. Samples: Submit two samples, 3 x 3 inch in size illustrating color, TEXTURE and pattern for each floor material
   1. TEXTURE must be approved by Architect/Engineer and Owner prior to installation of flooring.

D. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.
1.4 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.5 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
B. Installer: Company specializing in performing Work of this section with minimum three years experience, approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
B. Store resin materials in dry, secure area.
C. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.7 ENVIRONMENTAL REQUIREMENTS
A. Section 01 60 00 - Product Requirements.
B. Maintain minimum temperature in storage area of 60 degrees F, and a maximum storage temperature of 90 degrees F.
C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS
2.1 FLUID-APPLIED FLOORING
A. Manufacturers:
1. Dur-a-Flex, Inc., East Hartford, CT, 800/253-3539.
2. Desco Systems, St. Louis, MO, 800/373-8128
5. Substitutions: Section 01 60 00 – Product Requirements.
B. Approved Systems:
1. Dur-a-Flex: Dur-a-Quartz.
2. Desco Quartz Cremona
3. Stonhard, Inc.: Stonshield SLT.
5. Substitutions: Section 01 60 00 – Product Requirements.

2.2 COMPONENTS

A. Epoxy, two component, thermosetting, decorative slip resistant surface.
1. Primer: Epoxy two component 100 percent solids type as per manufacturer’s recommendations.
   a. Application Method: Squeegee and back roll.
2. Base Coats: 1/8 inch thick two component 100 percent solids, free flowing epoxy; double-broadcasted colored aggregate as selected by Architect / Engineer from manufacturer’s full line of color selections.
3. Aggregate: Small quartz chips of single or multiple colors as selected.
4. Top Coat: Epoxy, two component, 100 percent solids, thermosetting; clear.
   a. Surface to produce permanent slip resistance in Orange Peel, or light texture.
5. Tensile Strength: 1,600 pounds per square inch per ASTM C-307.
6. Flexural Strength: 4,000 pounds per square inch per ASTM C-580.
7. Hardness: 85 to 90 per ASTM D-2240, Shore D.
9. Abrasion Resistance: 0.06 gm maximum weight loss per ASTM D-4060, CS-17.
10. Flammability: Class I as per ASTM E-648.
11. Water Absorption: 0.1 percent as per ASTM C-413.
12. Color: As selected by Architect / Engineer from manufacturer’s full range of color selections.

2.3 ACCESSORIES

A. Divider Strips: Extruded mill finished aluminum, 1/8 inch thick, height to match flooring thickness, with anchoring features; color as selected by Architect/Engineer.

B. Control Joint Strips: Match divider strips; 1/4 inch nominal width, 1/8 inch wide neoprene filler strip between side strips, with anchoring features, strip height to suit flooring thickness.

C. Base Caps, and Separator Strips: Match divider strips, with projecting base of 1/8 inch.

D. Fillet Strips: Molded material compatible with flooring.

E. Subfloor Filler: Type recommended by flooring material manufacturer.

F. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify floor surfaces are smooth and flat with maximum variation as specified in Section 03 30 00 and are ready to receive Work.

C. Verify concrete floors have cured minimum 28 days, exhibit negative alkalinity, carbonization, and dusting, and are acceptable to flooring manufacturer.

D. Verify floor and lower wall surfaces are free of substances capable of impairing adhesion of adhesive and finish materials.

3.2 PREPARATION

A. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.

B. Prepare surfaces as required by manufacturer.

C. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

E. Clean substrate.

F. Apply primer as required to prevent "bleed-thru" or interference with adhesion by substances that cannot be removed.

G. Moisture Testing: Perform tests recommended by manufacturer and as follows.
   1. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
   2. If the relative humidity exceeds 75% then primer moisture mitigation system must be installed prior to resinous flooring installation.

H. There shall be no visible moisture present on the surface at the time of application of the system.

I. Integral Cove Base: Where scheduled, apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners.
J. Mechanical Surface Preparation:
   1. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufacturer’s recommendations.
   2. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine. All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
   3. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   4. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   5. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer’s recommendations.

3.3 INSTALLATION
   A. Accurately saw cut substrate to install divider strips.
   B. Install strips straight and level at locations indicated.
   C. Install fillet strips at base of walls where flooring is to be extended up wall as base.
   D. Install base divider strips to match floor pattern. Install terminating cap strip at top of base; attach securely to wall substrate.
   E. Apply each coat of flooring within thickness range required by manufacturer.
   F. Finish to smooth level surface.
   G. Install flooring in recessed type floor access covers.
   H. Provide joint in resinous flooring to comply with resinous flooring manufacturer’s written recommendations at substrate expansion and isolation joints.
      1. Apply joint sealant to comply with manufacturer’s written recommendations.

3.4 PROTECTION OF INSTALLED CONSTRUCTION
   A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
   B. Barricade area to protect flooring until cured. Prohibit traffic on floor finish until cured.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cementitious wood fiber plank acoustical wall and ceiling panel system and accessories.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. ASTM International:

C. APA-The Engineered Wood Association:

D. American Wood-Preservers’ Association:
   1. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
   2. AWPA C27 - Plywood, Fire-Retardant Pressure Treatment.

E. National Fire Protection Association:

F. National Institute of Standards and Technology:

1.3 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Conform to applicable code for flame and smoke ratings of 25/450 when tested to ASTM E84, NFPA 255.
1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:
   1. Indicate layout and dimensions of acoustical panels.
   2. Indicate interface with adjacent materials.

C. Product Data: Submit data on frame, wood fiber panel, and accessory materials. Submit data to establish that adhesives contain no added urea-formaldehyde resins.

D. Samples: Submit two samples of each component illustrating construction, profile and surface texture and finish.
   1. 6 inch x 6 inch sample of wood fiber panel unit illustrating color and texture of each color selected.

E. Manufacturer's Installation Instructions:
   1. Submit manufacturers written installation instructions.
   2. Submit special procedures, and perimeter conditions requiring special attention.

F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution Requirements: Requirements for submittals.

B. Operation and Maintenance Data: Submit fabric care and maintenance procedures, recommended fabric maintenance materials, and suggested schedule for cleaning.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

B. Regulatory Requirements and Approvals: Comply with requirements below.
   1. Southern Building code Congress International (SBCCI):
      a. SBCCI Report 9406A.
   2. International Conference of Building Officials (ICBO):
      a. ICBO Research Report No. 1116.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in manufacturer's original packaging. Inspect for damage.
C. Store materials indoors with environmental conditions as specified for installation.
D. Acclimate materials to installation conditions for seventy-two hours prior to installation.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not install acoustical treatment until space has been enclosed and is watertight, wet work is complete and dry and adjacent and related work is completed.

C. Do not install acoustical treatment until ambient temperature and humidity level will be continuously maintained at conditions indicated for Owner occupancy.

PART 2 PRODUCTS

2.1 ACOUSTICAL PANEL SYSTEM

A. Manufacturer: Tectum Inc.
   1. Contact: 105 South Sixth Street, Newark, Ohio 43055; Telephone: (888) 977-9691, (740) 345-9691; Fax: (800) 832-8869; Website: www.tectum.com.

B. Proprietary Systems: Acoustical wall and ceiling panel systems, including the following:
   1. Tectum Wall and Ceiling Panels:
      b. Thickness: 1 inch.
      c. Width: 48 inches (full width).
      d. Length: 144 inches (full length).
      e. Mounting Style: As indicated on Drawings.
      f. Light Reflectance: 70 percent.
      g. Fire Performance: Class A.
      h. Color: Factory finished in standard white color.

2.2 ACCESSORIES

A. Fasteners: Type recommended by panel manufacturer to suit application and color coordinated to match panel color.

B. Adhesive: Type recommended by panel manufacturer.

C. Touch-Up Paint: Type recommended by acoustical panel manufacturer.

D. Metal Frame Clips: Manufacturer’s standard clip for securing panels to framing.
PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements.

B. Verify substrate is flat, plumb and level and ready to receive the work of this section.

C. Verify adjacent and related work is complete.

D. Verify that environmental conditions are, and will continue to be maintained in accordance with manufacturer’s recommendations.

3.2 INSTALLATION

A. Screw head to be flush with panel surface.

B. Securely affix panels by means of splines attached vertically to smooth wall or furring strips. Engage vertical kerfs on the edges of the wall panels with splines. Apply adhesive or use Velcro hook and loop fastening where necessary.

C. Cover field cut edges by means of trim or other moldings.

D. Touch-up factory finishes in accordance with the panel manufacturer’s published instructions.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Indicated Position: 1/4 inch.

C. Maximum Offset From Indicated Alignment: 1/16 inch.

D. Maximum Out of Square: 1/4-inch difference in panel diagonals.

3.4 CLEANING

A. Section 01 70 00 - Execution Requirements: Requirements for cleaning.

B. Clean exposed surfaces of acoustical panels as recommended by the manufacturer.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paints and other coatings.

1.2 REFERENCES

A. ASTM International:

B. Green Seal:
   1. GC-03 - Anti-Corrosive Paints.
   2. GS-11 - Product Specific Environmental Requirements.

C. National Fire Protection Association:

D. Painting and Decorating Contractors of America:

E. South Coast Air Quality Management District:
   1. SCAQMD Rule 1113 - Architectural Coatings.

F. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.

G. Underwriters Laboratories Inc.:

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.
1.4 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
B. Product Data: Submit data on finishing products and special coatings.
C. Samples:
   1. Submit two paper chip samples illustrating full range of colors available for each
      surface finishing product scheduled.
D. Manufacturer's Installation Instructions: Submit special surface preparation procedures,
   and substrate conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of
   painted and coated surfaces.

1.6 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section
   with minimum three years documented experience.
B. Applicator: Company specializing in performing Work of this section with minimum
   three years documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
C. 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.
D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of
   90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.8 ENVIRONMENTAL REQUIREMENTS
A. Section 01 60 00 - Product Requirements.
B. Do not apply materials when surface and ambient temperatures are outside temperature
   ranges required by paint product manufacturer.
C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 foot candle measured mid-height at substrate surface.

1.9 SEQUENCING

A. Section 01 10 00 - Summary: Work sequence.

B. Verify existing conditions and requirements of other trades before starting Work.

C. Sequence application to the following:
   1. Do not apply finish coats until paintable sealant is applied.
   2. Back prime wood trim before installation of trim.

1.10 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five-year manufacturer warranty for paints and coatings.

1.11 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Supply 1 gallon of each color, type, and surface texture; store where directed by Owner.

C. Label container with color, type, and room locations, in addition to manufacturer's label.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers:
   1. The Glidden Co.
   2. MAB Paints.
   5. Pittsburg Paints.

2.2 COMPONENTS

A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
   1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.
B. **Accessory Materials:** Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.

C. **Patching Materials:** Latex filler.

D. **Fastener Head Cover Materials:** Latex filler.

**PART 3 EXECUTION**

3.1 **EXAMINATION**

A. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of Work. Report conditions capable of affecting proper application.

C. Test shop applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete and Concrete Unit Masonry: 12 percent.

3.2 **PREPARATION**

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for application preparation.

B. Prepare coatings as follows:
   1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
   2. For smooth flow and brushing properties.

C. **Surface Appurtenances:** Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. **Surfaces:** Correct defects and clean surfaces capable of affecting Work of this section. Remove or repair existing coatings exhibiting surface defects.

E. **Defects:**
   1. Correct defects and clean surfaces capable of affecting Work of this Section.
   2. Remove or repair existing coatings exhibiting surface defects.

F. **Marks:** Seal with shellac those which may bleed through surface finishes.

G. **Impervious Surfaces:** Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
H. Aluminum Surfaces Scheduled for Paint Finish:
   1. Remove surface contamination by steam or high-pressure water.
   2. Remove oxidation with acid etch and solvent washing.
   3. Apply etching primer immediately following cleaning.

I. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish:
   1. Remove foreign particles to permit adhesion of finishing materials.
   2. Apply compatible sealer or primer.

J. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.


L. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

N. Plaster Surfaces:
   1. Fill hairline cracks, small holes, and imperfections with latex patching plaster.
   2. Make smooth and flush with adjacent surfaces.
   3. Wash and neutralize high-alkali surfaces.

O. Shop Primed Steel 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.

P. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

Q. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

R. Interior Wood Items Scheduled to Receive Paint Finish:
   1. Wipe off dust and grit prior to priming.
   2. Seal knots, pitch streaks, and sappy sections with sealer.
   3. Fill nail holes and cracks after primer has dried.
   4. Sand between coats.

S. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
T. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

U. Existing Glazed Block: Clean all surfaces and abrade with heavy grit scouring pad as per paint manufacturer to ensure warranty coverage.

V. Existing Work:
   1. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

3.3 APPLICATION

A. Multiple colors shall be selected and accent walls shall be a component of the Project.

B. Comply with MPI - Architectural Painting Manual.

C. Do not apply finishes to surfaces that are not dry.

D. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

H. Cleaning:
   1. Vacuum surfaces to remove loose particles.
   2. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Fillers:
   1. If clear finishes are required, tint fillers to match wood.
   2. Work fillers into grain before set, and wipe excess from surface.

J. Concealed Surfaces:
   1. Prime concealed surfaces of interior woodwork with primer paint.
   2. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.

K. Finishing Mechanical And Electrical Equipment:
   1. Refer to Division 22, Division 23, and Division 26 for schedule of color-coding and identification banding of equipment, ductwork, piping, and conduit.
   2. Paint shop primed equipment.
   3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
   4. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
   5. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, and grilles to match face panels.
   6. Paint exposed conduit and electrical equipment occurring in finished areas.
7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
8. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
B. Inspect and test questionable coated areas.

3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect Work of other trades and surfaces not being painted.
B. Automatic fire sprinklers must not be painted and must be protected from paint over spray. Any sprinklers inadvertently painted must be replaced rather than cleaned.
C. Protect completed Work from damage by other trades.

3.7 SCHEDULE - INTERIOR SURFACES

A. Steel:
   1. One coat SW Pro Industrial Pro-Cryl Primer; B66-310 or approved equal.
      a. Two to four mils dry.
   2. Two coats SW ProMar 200 Alkyd Semi-Gloss; B34W200 or approved equal.
      a. Four mils wet, 1.7 mils dry.

B. Steel - Galvanized:
   1. One coat SW Pro Industrial Pro-Cryl Primer; B66-310 or approved equal.
      a. Two to four mils dry.
   2. Two coats SW ProMar 200 Alkyd Semi-Gloss; B34W200 or approved equal.
      a. Four mils wet, 1.7 mils dry per coat.

C. Interior Ferrous Metal (Exposed Structure / Decking) Finish Dry Fall-Out:
   1. One coat SW Save-Lite Dry Fall; B47W62 or approved equal.
      a. Three point two mils wet.

D. Gypsum Board Ceilings:
   1. One coat SW PrepRite 200 Latex Primer; B28W200 or approved equal.
      a. Four mils wet, 1.2 mils dry.
   2. Two coats SW ProMar 200 Latex Semi-Gloss; B300W200 or approved equal.
      a. Four mils wet, 1.4 mils dry per coat.
C. Gypsum Board Walls:
   1. One coat SW PrepRite 200 Latex Primer; B28W200 or approved equal.
      a. Four mils wet, 1.2 mils dry.
   2. Two coats SW ProMar 200 Latex Semi-Gloss; B300W200 or approved equal.
      a. Four mils wet, 1.4 mils dry per coat.

D. Concrete Block:
   1. One coat SW Heavy Duty Block Filler; B42W46 or approved equal.
      a. 75 to 125 square feet per gallon.
   2. Two coats SW Water Based Catalyzed Epoxy; B70 or approved equal.
      a. Four mils wet, 1.4 mils dry per coat.

E. Glazed Block:
   1. One coat of SW Kem Bond HS Primer; B50Z Series or approved equal.
      a. Four mils wet, 1.2 mils dry.
   2. Two coats of SW Water Based Catalyzed Epoxy; B70 or approved equal.
      a. Four mils wet, 1.4 mils dry per coat.

3.8 SCHEDULE – EXTERIOR SURFACES

A. Steel:
   1. One coat SW Pro Industrial Pro-Cryl Universal Primer, B66-310 Series or approved equal.
      a. Ten mils wet, 4 mils dry.
   2. Two coats SW Metalatex Acrylic Semi-Gloss, B42 Series or approved equal.
      a. Four mils wet, 1.5 mils dry per coat.

B. Steel Galvanized:
   1. Two coats SW Metalatex Semi-Gloss, B42 Series or approved equal.
      a. Four mils wet, 1.5 mils dry per coat.

END OF SECTION
SECTION 10 14 00 - SIGNAGE

1. GENERAL

1.1 SUMMARY

A. Section includes interior signs.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.

C. Samples: Submit two full size signs illustrating type, style, letter font, and colors specified; method of attachment.

D. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Package signs, labeled in name groups.

C. Store adhesive attachment tape at ambient room temperatures.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not install signs when ambient temperature is lower than recommended by manufacturer.

C. Maintain this minimum temperature during and after installation of signs.
2. PRODUCTS

2.1 INTERIOR SIGNS

A. Manufacturers:
   1. InPro Corporation.
   2. APCO Graphics.
   3. ASI Sign Systems.
   4. Graphic Specialties, Inc.
   5. Substitutions: Section 01 60 00 – Product Requirements.

2.2 COMPONENTS

A. ADA compliant signs will consist of polyester based photopolymer, photoexposed and processed to achieve raised letters and Braille. Photopolymer is then laminated to an acrylic back plate as required by the sign type. Copy color is to be applied by silk-screening or hot-stamping. Raised lettering and Braille are to be integral with the sign face. Glued-on Braille strips or engraving to achieve raised letters and Braille is not acceptable:
   1. Raised Characters:
      a. Thickness: Raised characters shall be 1/32 inch minimum above their background.
      b. Style: Characters shall be sans serif. Characters shall not be italic, oblique, script, highly decorative, or of other unusual form.
      c. Character Proportions: Characters shall be selected from font where the width of the uppercase letter “O” is 55 percent minimum and 110 percent maximum of the height of the uppercase letter “I”.
      d. Character Height: Character height measured vertically from the baseline of the character shall be 5/8 inch minimum and 2 inches maximum based on the height of the uppercase letter “I”.
      e. Stroke Thickness: Stroke thickness of the uppercase letter “I” shall be 15 percent maximum of the height of the character.
      f. Character Spacing: Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch minimum.
      g. Line Spacing: Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.
   2. Braille:
      a. Braille shall be contracted, Grade 2.
      b. Dimensions and Capitalization: Braille dots shall have a domed or rounded shape. The indicated on an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials and acronyms.
c. Position: Braille shall be positioned below the corresponding text. If text is multi-lines, Braille shall be placed below the entire text. Braille shall be separated 3/8 inch minimum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.

3. Pictogram Field: Pictograms and symbols of accessibility shall have a field height of 6 inches minimum. Characters and Braille shall not be located in the pictogram field.
   a. Finish and Contrast: Pictograms and symbols of accessibility shall have a non-glare finish. Pictograms and symbols of accessibility shall contract with their field with either a light pictogram on a dark field or a dark pictogram on a light field.
   b. Text Descriptors: Pictograms shall have text descriptors located directly below the pictogram field.

2.3 FINISHES

   A. Paints: Background color shall be applied, via spray application, over entire ADA (photopolymer) portion of plaque using air-dried polyurethane. Spraying copy color first followed by floor coating is prohibited. Roller coated copy is not acceptable.

   B. Finishes: Background and copy finish shall be clean, sharp and free of airborne debris and “orange peel” texture.

   C. Topcoat: Entire plaque shall be spray top coated with a clear matte urethane to protect the surface painted surface.

2.4 ACCESSORIES

   A. Tape Adhesive: Double sided tape, permanent adhesive.

3. EXECUTION

3.1 EXAMINATION

   A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

   B. Ensure surfaces are ready for sign installation.

3.2 INSTALLATION

   A. Install signs after surfaces are finished, in locations indicated on Drawings and as directed by Architect/Engineer.

   B. Locate sign on wall surface, level.
C. Installation Location:
1. Tactile characters on signs shall be located 48 inches minimum and 60 inches maximum above the finish floor surface, measured from the baseline of the lowest tactile character.
2. Locate signs containing tactile letters alongside the door at the latch side of single doors.
3. Locate signs containing tactile letters on the inactive leaf of double doors.
4. Locate signs containing tactile letters to the right side of double doors with two active leaves.
5. Position sign containing tactile letters so that a clear floor space of 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes solid plastic toilet compartments.

B. Related Sections:
   1. Section 06 10 53 – Miscellaneous Rough Carpentry: Concealed wood framing and blocking for compartment support.
   2. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.2 REFERENCES

A. ASTM International (ASTM):
   2. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

B. International Code Council (ICC)/American National Standards Institute (ANSI):
   1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated as accessible.

C. National Fire Protection Agency:


E. United States Department of Justice:
1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, section views, dimensions, details of wall and floor supports, door swings and attachment details. Show centerline of plumbing fixtures. Include choice of options with details.

C. Product Data: Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

D. Warranty: Submit sample of warranty.

E. Samples: Submit two 2x2 inch in size illustrating panel finish, color, and sheen for color selection. Submit samples of hardware and accessories if material and color selection is required.

F. Manufacturer's Installation Instructions: Submit special procedures and perimeter conditions requiring special attention.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance and cleaning instructions.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.
   1. Door Hinges: One hinge with associated fasteners.
   2. Latch and Keeper: One latch and keeper with associated fasteners.
   3. Door Bumper: One bumper with associated fasteners.
   4. Door Pull: One door pull with associated fasteners.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

B. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimal results. Do not install products under environmental conditions outside manufacturer’s absolute limits.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with placement of support framing and anchors in wall.
1.8 DELIVERY, STORAGE AND HANDLING
A. Store products in manufacturer’s unopened packaging until ready for installation. Store in an upright condition.

1.9 WARRANTY
A. Manufacturer guarantees its plastic against breakage, corrosion and delamination under normal conditions for a period of 15 years from the date of substantial completion.

1.10 QUALITY ASSURANCE
A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum 5 years’ experience in the manufacture of toilet compartments. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:
   1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
   2. Samples of each component of product specified.
   3. List of successful installations of similar products available for evaluation by Architect / Engineer.
B. Installers Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum 3 years.
C. Source Limitations: Obtain toilet compartment components and accessories from single manufacturer.
D. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
E. Materials: Doors, panels and pilasters shall be constructed of High Density Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.

PART 2 PRODUCTS
2.1 SOLID PLASTIC TOILET COMPARTMENTS
A. Manufacturers:
   1. Bradley.
   2. Columbia Partitions.
   3. Accurate Partitions Corp.
   4. Scranton Products.
B. Product Description: Floor mounted, overhead braced.
2.2 COMPONENTS

A. Toilet Compartments: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges and with homogenous color and pattern throughout thickness of material.
   1. Color: As selected by Architect / Engineer from manufacturer’s full color range. Color selections may vary for each building and may vary for girl’s and boy’s toilet rooms.
   2. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains or other imperfections.
   3. Provide aluminum heat sink at bottom edge of panels and doors.

B. Door and Panel Dimensions:
   1. Door Width: 24 inch.
   2. Accessible Door Width: 36 inch, out-swinging.
   3. Ambulatory Accessible Door Width: 34 inch, out-swinging.
   4. Height: 55 to 58 inches, unless noted otherwise on Drawings.

2.3 MATERIALS

A. Stainless Steel Sheet: ASTM A 240 or A 666, Type 304.

B. Stainless Steel Castings: ASTM A 743 or ASTM A 167, Type 304.

C. Aluminum: ASTM B 221 or ASTM 6463-T5 alloy.


2.4 ACCESSORIES

A. Pilaster Shoe: Formed of solid plastic of color to match partition or 20 gage Type 305 stainless steel, 3 to 4 inches high, concealing floor fastenings. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant screws.
   1. Headrail brackets shall be 20 gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant screws.

C. Wall Brackets: Full height, continuous stainless steel channel.

D. Anchorage and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.
E. Hardware: Heavy duty extruded aluminum (6463-T5 alloy):
   1. Hinges: Manufacturer's minimum 0.0781 inch thick stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through-bolts.
   2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast stainless steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
   3. Coat Hook: Manufacturer's heavy-duty combination cast stainless steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
   5. Door Pull: Manufacturer's heavy-duty cast stainless steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.

2.5 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

PART 3 EXECUTION

2.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Do not begin installation until substrates have been properly prepared for compliance with requirements for fastening, support, alignment, operating clearances and other conditions affecting performance.

C. If substrate preparation is the responsibility of another installer, notify the Architect / Engineer of unsatisfactory preparation before proceeding.

D. Verify field measurements are as indicated on shop drawings and as instructed by manufacturer.

E. Verify correct spacing of and between plumbing fixtures.

F. Verify correct location of built-in framing, anchorage, and bracing.
2.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

2.3 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
   1. Maximum Clearances:
      a. Pilaster and Panels: ½ inch.
      b. Panels and Walls: 1 inch.
   2. Full Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
      a. Located bracket fasteners so holes for wall anchors occur in masonry or tile joints.

B. No evidence of cutting, drilling and / or patching shall be visible on the finished Work. Replace damaged or scratched materials with new materials.

C. Overhead Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

2.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Indicated Position: ¼ inch.

C. Maximum Variation From Plumb: 1/8 inch.

2.5 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

C. Adjust adjacent components for consistency of line or plane.
2.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

2.7 FINAL CLEANING

A. Remove packaging and construction debris and legally dispose of off-site.

B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION
SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY
   A. Section includes toilet room accessories.
   B. Related Sections:
      1. Section 06 10 00 - Rough Carpentry: In-wall framing and plates.

1.2 REFERENCES
   A. ASTM International:
      1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized)
         Coatings on Iron and Steel Products.
      2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on
         Iron and Steel Hardware.
      3. ASTM A269 - Standard Specification for Seamless and Welded Austenitic
         Stainless Steel Tubing for General Service.
      4. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated
         (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
      5. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip,
         Plate, and Flat Bar.
      6. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper
   B. Federal Specification Unit:

1.3 DESIGN REQUIREMENTS
   A. Design grab bars and attachments to resist minimum 250 pound concentrated load
      applied at any point in any direction, forces as required by applicable code.

1.4 SUBMITTALS
   A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
   B. Product Data: Submit data on accessories describing size, finish, and details of function,
      attachment methods.
   C. Manufacturer's Installation Instructions: Submit special procedures, and conditions
      requiring special attention.
1.5 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.1 TOILET AND BATH ACCESSORIES

A. Manufacturers:
   2. American Specialties, Inc.
   4. Bradley Corp.
   5. Substitutions: Not permitted.

2.2 COMPONENTS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Keys: Furnish 6 keys for each accessory to Owner; master key accessories.
C. Stainless Steel Sheet: ASTM A666, Type 304.
D. Stainless Steel Tubing: ASTM A269, stainless steel.
E. Adhesive: Contact type, waterproof.
F. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof.
G. Expansion Shields: Fiber, or rubber as recommended by accessory manufacturer for component and substrate.
2.3 TOILET ROOM ACCESSORIES (Provide accessories as indicated on Drawings)

A. Toilet Paper Dispenser: Salvaged and reinstalled by Contractor. Owner will provide additional units if more units are required than what can be salvaged.

B. Soap Dispenser: Salvaged and reinstalled by Contractor. Owner will provide additional units if more units are required than what can be salvaged.

C. Mirrors: Stainless steel framed, ¼ inch thick polycarbonate sheet, highly impact resistant.
   1. Size: As indicated on Drawings.
   2. Frame: 18 gage, Type 304 stainless steel, with mitered and welded and ground corners, and tamperproof hanging system; No. 4 finish.
   3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and non-absorptive filler material.

D. Grab Bars: Stainless steel, 11/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1½ inches clearance between wall and inside of grab bar.
   1. Length and configuration: As indicated on Drawings.

E. Sanitary Napkin Disposal Unit: Stainless steel, surface mounting with self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

2.4 FACTORY FINISHING

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, Type SC 2, satin finish, unless otherwise noted.

C. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify exact location of accessories for installation.

C. Verify field measurements are as indicated on product data.

D. See Section 06 10 53 for installation of blocking, reinforcing plates and concealed anchors in walls.
3.2 INSTALLATION

A. Install plumb and level, securely and rigidly anchored to substrate.

B. Mounting Heights and Locations: As indicated on Drawings and as required by accessibility codes.

3.3 SCHEDULES

A. Framed Mirror, 18 x 30 inches x ¼ inch tempered glass:
   1. ASI: Model 0600.

B. Grab Bars, length as indicated on Drawings:
   1. ASI: Model 3100.
   4. Bobrick: Model B-4806

C. Sanitary Napkin Disposal, surface mounted:
   1. ASI: Model 0473-1A.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Prefabricated plastic laminate countertop surfaces.

B. Related Sections:
   1. Section 06 10 00 – Rough Carpentry: Wood blocking.

1.2 REFERENCES

A. American National Standards Institute.
   1. ANSI A156.9 - Cabinets Hardware.
   2. ANSI A208.1 - Mat formed Particleboard.

B. Architectural Woodwork Institute.
   1. AWI - Quality Standards Illustrated.

C. National Electrical Manufacturers Association.
   1. NEMA LD3- High Pressure Decorative Laminates.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal Procedures.

B. Shop drawings shall be submitted for approval within thirty days after formal notification of award of contract. Drawings shall consist of floor plans indicating arrangement and relation to adjacent work and equipment, and complete elevations of casework. Centerline of service requirements shall be noted for use by other trades. A schedule of all sinks, fittings, and accessories that are part of this contract shall be provided.

C. Color samples shall be submitted for selection by Architect/Engineer. Samples of actual material and color shall be available as required.

D. Additional catalog cuts, details and samples of hardware as requested by Architect / Engineer for evaluation and coordination.

1.4 QUALITY ASSURANCE;

A. Manufacturer: Company specializing in manufacture of institutional and commercial plastic laminate casework with minimum of five years experience.

B. Installer Qualifications: Installer with 5 years’ experience who has successfully completed installations of plastic laminate faced casework similar in material, design, and extent to that indicated for this project.
C. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom Grade.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
B. Protect units from moisture damage.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.
B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 WARRANTY

A. Casework manufacturer shall warrant for a period of three years, the product manufactured by it to be free from defects in material and workmanship when properly installed under normal use, but not limited to delamination, swelling or warping.

PART 2 PRODUCTS

2.1 GENERAL CASEWORK

A. Manufacturers:
   1. Case Systems, Inc.
   2. LSI Corporation of America, Inc.
   3. Precision Millwork Company.
   4. Reynolds & Doyle, Inc.
   5. Stevens Cabinet Co., Division of Stevens Industries.
   7. Wilson Kitchens, Inc.

2.2 SURFACE MATERIALS

2.3 CORE MATERIALS

A. Particleboard: Shall be high performance industrial grade core. Particleboard shall be 45 to 48 pound density 3-ply type formation conforming to ANSI A208.1 and ASTM D1037-91A standards.
B. Medium Density Fiberboard: Core shall be minimum 48 pound density conforming to ANSI A208.1 MD-130 standards.

2.4 LAMINATE TOPS

A. Countertops shall be high pressure decorative laminate, thermoset to core using catalyzed PVA glue with minimum average pressure of 80 pounds per square inch and average 180 degree F temperature. Decorative laminate shall meet NEMA LD3-2005 PF-42 specification standards.

B. Laminate tops shall be solid particleboard core structures and laminated with backer sheet.

PART 3 EXECUTION

3.1 INSTALLATION

A. The installer must examine the job site and the conditions under which the work in this section is to be performed, and notify the contractor in writing of any unsatisfactory conditions. Do not proceed with work under this section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Countertops, and related materials to be conditioned to average prevailing humidity condition in installation areas prior to start of work.

C. Install countertops with factory-trained supervision authorized by manufacturer. Work shall be installed plumb, level, true and straight with no distortions. (Shim as required). Securely attached to building structure with anchorage devices of appropriate type, size and quantity to meet applicable codes, specifications, and safety conditions. Where laminate clad countertop abuts other finished work, scribe and trim to accurate fit.

D. Repair, or remove and replace, defective work as directed upon completion of installation.

E. Clean plastic surfaces, repair minor damage per plastic laminate manufacturer's recommendations. Replace other damaged parts of units.

F. Advise contractor of procedures and precautions for protection countertops from damage by other trades until acceptance of work by Owner.

G. Cover countertops with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Tags.
   3. Stencils.
   4. Pipe markers.
   5. Ceiling tacks.
   7. Lockout devices.

1.2 REFERENCES

A. American Society of Mechanical Engineers:

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog literature for each product required.

B. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

D. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.4 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
PART 2 PRODUCTS

2.1 TAGS
    A. Metal Tags:
        1. Brass or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter or square, with finished edges.

2.2 PIPE MARKERS
    B. Plastic Pipe Markers:
        1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
    C. Plastic Tape Pipe Markers:
        1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.3 LABELS
    A. Description: Aluminum or Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification.

PART 3 EXECUTION

3.1 PREPARATION
    A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION
    A. Install identifying devices after completion of coverings and painting.
    B. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
    C. Install tags using corrosion resistant chain. Number tags consecutively by location.
    D. Identify valves in main and branch piping with metallic tags.
E. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

3.3 SCHEDULES

A. Identification:

1. Domestic Cold Water Piping.
   a. Identification Type: Tape
   b. Background Color: Green
   c. Lettering Size: Varies
   d. Lettering Color: White

2. Domestic Hot Water.
   a. Identification Type: Tape
   b. Background Color: Yellow
   c. Lettering Size: Varies
   d. Lettering Color: Black

B. Valve Tags:

1. Domestic Cold Water.
   a. Tag Material: Metal
   b. Tag Shape: Round
   c. Tag Color: N/A

2. Domestic Hot Water.
   a. Tag Material: Metal
   b. Tag Shape: Round
   c. Tag Color: N/A

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Piping system insulation.
   2. Pipe insulation jackets.

1.2 REFERENCES
A. ASTM International:
   1. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric
      Cellular Thermal Insulation in Sheet and Tubular Form.

1.3 SUBMITTALS
A. Product Data: Submit product description, thermal characteristics and list of materials
   and thickness for each service, and location.
B. Manufacturer's Installation Instructions: Submit manufacturers published literature
   indicating proper installation procedures.
C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE
A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke
   developed index of not exceeding 50 in accordance with ASTM E84.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Accept materials on site in original factory packaging, labeled with manufacturer's
   identification, including product density and thickness.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and
   damage, by storing in original wrapping.

1.6 FIELD MEASUREMENTS
A. Verify field measurements prior to fabrication.
PART 2 PRODUCTS

2.1 ELASTOMERIC CELLULAR FOAM

A. Manufacturers:
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular form:
   ASTM C534; Type I, Tubular form.

C. ‘K’ factor: ASTM C177, max. 0.27 at 75 degrees F.

D. Conform to ASTM E84 with a flame spread of less than 25 and a smoke spread of less than 50.

E. Elastomeric Foam Adhesive:
   1. Manufacturers: Same as insulation manufacturer.
   2. Air dried, contact adhesive, compatible with insulation.

2.2 PIPE INSULATION AND EQUIPMENT JACKETS

A. PVC Plastic Pipe Jacket:
   1. Manufacturers:
      b. Ceel-co.
      c. Proto.
      d. Manufacturer of insulation to be covered.
      e. Substitutions: Section 01 60 00 - Product Requirements.

   2. Product Description: ASTM D1784, One piece molded type fitting covers and sheet material, off-white color.
   3. Thickness: 20 mil.

B. Covering Adhesive Mastic:
   1. Compatible with insulation.
PART 3 EXECUTION

3.1 EXAMINATION

A. Verify piping and equipment has been tested before applying insulation materials.
B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Exposed Piping: Locate insulation and cover seams in least visible locations.
B. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
C. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
D. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.
E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface.
F. Finish insulation at supports, protrusions, and interruptions.

3.3 SCHEDULES

a. Fluid Operating Temperature Range below 40 Deg F:
   1) Minimum insulation thickness with k value 0.20-0.26 ((Btu*in)/(h*ft^2*F)):
      a) NPS less than 1 inch: 1/2 inches thick.
      b) NPS 1 inch to less than 8 inches: 1 inch thick.
      c) NPS 8 inches or greater: 1 1/2 inch thick.

b. Fluid Operating Temperature from 40 Deg F to 60 deg F:
   1) Minimum insulation thickness with k value 0.21-0.27 ((Btu*in)/(h*ft^2*F)):
      a) NPS less than 1 1/2 inches: 1/2 inches thick
      b) NPS 1 1/2 inches or greater: 1 inch thick

c. Fluid Operating Temperature from 105 Deg F to 140 deg F:
   1) Minimum insulation thickness with k value 0.21-0.28 ((Btu*in)/(h*ft^2*F)):
      a) NPS less than 1 1/2 inches: 1 inches thick
      b) NPS 1 1/2 inches or greater: 1-1/2 inches thick

d. Fluid Operating Temperature from 141 Deg F to 200 deg F:
   1) Minimum insulation thickness with k value 0.25-0.29 ((Btu*in)/(h*ft^2*F)): 
a) NPS less than 1 1/2 inches: **1-1/2 inches** thick
b) NPS 1 1/2 inches or greater: **2 inches** thick

e. Fluid Operating Temperature from 201 Deg F to 250 deg F:
   l) Minimum insulation thickness with k value 0.27-0.30
      ((Btu*in)/(h*ft^2*F)):
      a) NPS less than 4 inches: **2-1/2 inches** thick
      b) NPS 4 inches or greater: **3 inches** thick

f. Fluid Operating Temperature from 251 Deg F to 350 deg F:
   l) Minimum insulation thickness with k value 0.29-0.32
      ((Btu*in)/(h*ft^2*F)):
      a) NPS less than 1 inch: **3 inches** thick
      b) NPS 1 inch to less than 1-1/2 inches: **4 inches** thick
      c) NPS 1-1/2 inches and greater: **4-1/2 inches** thick

g. Fluid Operating Temperature from greater than 350 deg F:
   l) Minimum insulation thickness with k value 0.32-0.34
      ((Btu*in)/(h*ft^2*F)):
      a) NPS less than 1 inch: **4-1/2 inches** thick
      b) NPS 1 inch and greater: **5 inches** thick

h. For insulation outside the state conductivity range, the minimum
   thickness (T) shall be as follows
   l) $T = r \{(1+t/r)K/k-1\}$
      a) $T$ = minimum insulation thickness
      b) $r$ = actual outside radius of pipe
      c) $t$ = insulation thickness listed for applicable fluid
         temperature and pipe size
      d) $K$ = conductivity of alternate material at mean rating
         temperature indicate for the applicable fluid temperature
      e) $k$ = the upper value of the conductivity range listed in
         the table for the applicable fluid temperature

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Domestic water piping, above grade.
   2. Unions and flanges.
   3. Valves.
   4. Pipe hangers and supports.
   5. Diaphragm type compression tanks.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   3. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.

B. American Society of Sanitary Engineering:
   1. ASSE 1010 - Performance Requirements for Water Hammer Arresters.

C. ASTM International:
   5. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
   6. ASTM F1807 – Brass Insert Fittings.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
   3. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
   5. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
   6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
E. Plumbing and Drainage Institute:

1. PDI WH201 - Water Hammer Arrestor Standard.

1.3 SUBMITTALS

A. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

B. Manufacturer's Installation Instructions: Submit installation instructions for valves and accessories.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of valves and equipment.

E. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.4 QUALITY ASSURANCE


B. Maintain one copy of each document on site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
1.6 FIELD MEASUREMENTS
A. Verify field measurements prior to fabrication.

1.7 EXTRA MATERIALS
A. Furnish two packing kits for each size valve.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, ABOVE GRADE
A. Copper Tubing: ASTM B88, Type L or K, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Press Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze, O-rings for copper press fittings shall be EPDM. Joints shall be compression type made with manufacturer’s tool.
   3. Tee Connections: Mechanically formed extruded outlet collars with notched and dimpled branch tube. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.2 UNIONS
A. Unions for Pipe 2 inches and Smaller:
   1. Copper Piping: Class 150, bronze unions with soldered.
   2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 BALL VALVES
A. Manufacturers:
   2. Hammond Valve.
   4. NIBCO, Inc.
   5. Stockham Valves & Fittings.

B. 2 inches and Smaller: MSS SP 110, Class 150, bronze, two piece body, type 316 chrome-plated brass ball, full port, teflon seats, blow-out proof stem, solder or threaded ends with union, lever handle with balancing stops.
2.4 PIPE HANGERS AND SUPPORTS

A. Manufacturers:

1. Carpenter & Paterson Inc.
2. Creative Systems Inc.
3. Flex-Weld, Inc.
4. Globe Pipe Hanger Products Inc.
5. Michigan Hanger Co.
7. Substitutions: Not Permitted.

B. Plumbing Piping: Conform to ASME B31.9, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.

C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

D. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.

E. Hangers for Hot Pipe, Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.

F. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

G. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.

H. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamps.

I. Vertical Support: Steel riser clamp.

J. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

K. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

L. Copper Pipe Support: Carbon steel ring, adjustable, copper plate.

2.5 DIAPHRAGM-TYPE COMPRESSION TANKS

A. Manufacturers:

1. Amtrol.
2. Taco.
3. Watts.
4. Zurn/Wilkens.
5. Substitutions: Not Permitted.
B. Construction: Welded steel, tested and stamped in accordance with ASME Section VIII; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles, approved for potable water.

C. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 40 psig.

D. Size: As scheduled on Drawings.

2.6 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Zurn.
2. Wade.
3. Watts.
5. Josam.

B. ASSE 1010; stainless steel or copper construction, bellows or piston type sized in accordance with PDI WH-201.

C. Pre-charged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

3.2 INSTALLATION - HANGERS AND SUPPORTS

A. Inserts:

1. Provide inserts for placement in concrete forms.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
B. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9, ASTM F708 and MSS SP 89.
2. Support horizontal piping as schedule.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
7. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.3 INSTALLATION - ABOVE GROUND PIPING

A. Install non-conducting dielectric connections wherever jointing dissimilar metals.
B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
C. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.
D. Group piping whenever practical at common elevations.
E. Slope piping and arrange systems to drain at low points.
F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.
H. Provide access where valves and fittings are not accessible.
I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
K. Provide mechanically formed extruded outlet tees per ASTM F2014 and in accordance with tool manufacturer’s recommendations.
L. Provide copper press fittings connections in accordance with manufacturer’s recommendations, using manufacturer’s approved tools. Joints: Remove burrs and clean ends. Fully insert tubing into fitting and mark pipe ends to ensure full insertion into coupling or fitting. Check alignment against mark to assure tubing is fully inserted. Press joint using manufacturer’s tool.

M. Install domestic water piping in accordance with ASME B31.9.

N. Provide all proper adapters and fittings for transitions between different piping materials as required.

O. Sleeve pipes passing through partitions, walls and floors.

P. Install unions downstream of all valves and equipment or apparatus connections.

Q. Install valves with stems upright or horizontal, not inverted.

R. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

S. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

T. Install ball valves for throttling, bypass, or manual flow control services.

U. Install potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, irrigation systems, flush valves, interior and exterior hose bibs.

V. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping at all long supply piping runs as required by the Illinois Plumbing Code (Illinois Department of Public Health).

W. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures. Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

3.4 FIELD QUALITY CONTROL

A. Test domestic water piping system in accordance with Illinois Plumbing Code and any additional requirements by the local authority having jurisdiction.

3.5 CLEANING

A. Disinfect water distribution system.

B. Prior to starting work, verify system is complete, flushed and clean.

C. Verify pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
D. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.

E. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. When final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.6 SCHEDULES

A. Pipe Hanger Spacing:

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM HANGER SPACING</th>
<th>HANGER ROD DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper Tube, 1-1/4 inches and smaller</td>
<td>6’-0”</td>
<td>1/2”</td>
</tr>
<tr>
<td>Copper Tube, 1-1/2 inches and larger</td>
<td>10’-0”</td>
<td>1/2”</td>
</tr>
</tbody>
</table>

END OF SECTION
SECTION 22 13 00 - FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewer piping above grade.
2. Unions and flanges.
3. Pipe hangers and supports.

1.2 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME A112.21.1 - Floor Drains.
3. ASME B31.9 - Building Services Piping.

B. ASTM International:


C. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
1.3 SUBMITTALS

A. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
   2. Hangers and Supports: Submit manufacturers catalog information including load capacity.
   3. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

B. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of equipment and clean-outs.

1.4 QUALITY ASSURANCE


1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: ASTM C564, rubber gasket joint devices or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hub-less, service weight.
   1. Fittings: Cast iron, CISPI 301.
C. PVC Pipe: ASTM D2665, polyvinyl chloride (PVC) material.
   1. Fittings: ASTM D2665, PVC.

2.2 UNIONs AND FLANGES
A. Unions for Pipe 2 inches and Smaller:
   1. PVC Piping: PVC.
B. Flanges for Pipe 2-1/2 inches and Larger:
   1. PVC Piping: PVC flanges.
   2. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.3 PIPE HANGERS AND SUPPORTS
A. Manufacturers:
   1. Carpenter & Paterson Inc.
   2. Creative Systems Inc.
   3. Flex-Weld, Inc.
   4. Globe Pipe Hanger Products Inc.
   5. Michigan Hanger Co.
   7. Substitutions: Not Permitted.
B. Drain, Waste, and Vent: Conform to ASME B31.9, ASTM F708, MSS SP 58, MSS SP 69, MSS SP 89.
C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
D. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
F. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
G. Wall Support for Pipe Sizes 3 inches and Larger: Welded steel bracket and wrought steel clamp.
H. Vertical Support: Steel riser clamp.
I. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
J. Copper Pipe Support: Carbon-steel, copper-plated adjustable ring.
2.4 CLEANOUTS

A. Manufacturers:

1. Zurn.
2. Wade.
3. Watts.
5. Josam.
7. Substitutions: Not Permitted.

B. Cleanout to Floor (COTF & COTF-2): Adjustable, epoxy coated cast body, tapered bronze plug, round, non-skid, nickel bronze cover (recessed top for floor finish where required, verify with A/E & owner).

C. Cleanout to Wall (COTW): Line type with lacquered cast iron body and bronze plug, and round stainless steel access cover secured with machine screw.

D. Interior Unfinished Accessible Areas (CO-1): Line type with lacquered cast iron body and bronze plug.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9, ASTM F708, and MSS SP 89.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
7. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
10. Install hangers adjacent to motor driven equipment with vibration isolation; refer to Section 21 05 48.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.
C. Install floor cleanouts at elevation to accommodate finished floor.
D. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
F. Install piping to maintain headroom. Do not spread piping, conserve space.
G. Group piping whenever practical at common elevations.
H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
I. Provide access where fittings are not accessible.
J. Provide membrane on floor drains on all above grade floor drains.
K. Install piping penetrating roofed areas to maintain integrity of roof assembly.
L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
M. Install bell and spigot pipe with bell end upstream.
N. Sleeve pipes passing through partitions, walls and floors.
O. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

P. Support cast iron drainage piping at every joint.

3.5 FIELD QUALITY CONTROL


3.6 SCHEDULES

PIPE HANGER SPACING

<table>
<thead>
<tr>
<th>PIPE MATERIAL/SIZE</th>
<th>MAXIMUM SPACING</th>
<th>HANGER ROD DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>(INCHES)</td>
<td>(FEET)</td>
<td>(INCHES)</td>
</tr>
<tr>
<td>Cast Iron (All Sizes)</td>
<td>5</td>
<td>5/8</td>
</tr>
<tr>
<td>Cast Iron - 10ft. Length (All Sizes)</td>
<td>10</td>
<td>5/8</td>
</tr>
<tr>
<td>PVC (All Sizes)</td>
<td>4</td>
<td>3/8</td>
</tr>
</tbody>
</table>

Note for Cast Iron Pipe: Provide close to joint on barrel. Also provide hanger at each change of direction and each branch connection.

END OF SECTION
SECTION 22 33 00
ELECTRIC DOMESTIC WATER HEATERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electric water heaters – Tank type.

B. Related Sections:
   1. Section: 22 11 00 - Facility Water Distribution: Supply connections to domestic water heaters.
   2. Division 26 - Execution requirements for electric connections specified by this section.

1.2 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

B. American Society of Mechanical Engineers:
   1. ASME PTC 25 - Pressure Relief Devices.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate heat exchanger dimensions, size of taps, and performance data. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, taps, and drains.

C. Product Data: Submit dimensioned drawings of water heaters indicating components and connections to other equipment and piping. Submit electrical characteristics and connection locations.

D. Manufacturer's Installation Instructions: Submit mounting and support requirements.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit replacement part numbers and availability.
1.5 QUALITY ASSURANCE
   A. Water Heater Performance Requirements: Equipment efficiency not less than prescribed by ASHRAE 90.1.

1.6 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
   B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS
   A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
   B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Products storage and handling requirements.
   B. Accept water heaters on site in original labeled cartons. Inspect for damage.
   C. Protect tanks with temporary inlet and outlet caps. Maintain caps in place until installation.

1.9 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.10 WARRANTY
   A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
   B. Furnish manufacturer standard warranty for domestic water heaters.

PART 2 PRODUCTS

2.1 ELECTRIC WATER HEATER – TANK TYPE (WH-1)
   A. Manufacturers:
      1. Bradford White Corp.
      2. Lochinvar Corp.
      3. Rheem-Ruud
      4. State Industries
      5. Substitutions: Section 01 60 00 - Product Requirements.
B. Type: Automatic, electric, vertical storage.

C. Capacity: As scheduled on drawings.

D. Tank: Glass lined welded steel, thermally insulated with minimum one inch thick glass fiber; encased in corrosion-resistant steel jacket with baked-on enamel finish.

E. Controls: Automatic water thermostat with externally adjustable temperature range from 120 to 170 degrees F, flanged or screw-in nichrome elements, enclosed controls and electrical junction box.

F. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, and ASME temperature and pressure relief valve.

PART 3 EXECUTION

3.1 INSTALLATION

A. Maintain manufacturer's recommended clearances around and over water heaters. Coordinate exact mounting locations of instantaneous water heater with A/E.

B. Install tank type water heater on concrete housekeeping pad, minimum 3-1/2 inches high and 6 inches larger than water heater base on each side. Refer to Section 03 30 00.

C. Provide properly sized, domestic water approved, thermal expansion tank on the cold water piping to the water heater as required by code and indicated on schedule.

D. Connect domestic water piping to supply and return water heater connections as required to provide complete, fully functional system.

E. Install the following piping accessories. Refer to Section 22 11 00. Coordinate required accessories for each type water heater with A/E.
   1. On supply: Thermometer well and thermometer; strainer, pressure gauge; shutoff valve.
   2. On return: Thermometer well and thermometer; shutoff valve.

F. Install discharge piping from relief valves and drain valves to nearest floor drain.

G. Install water heater trim, electrical devices and accessories furnished loose for field mounting.

H. Install control wiring between water heater control panel and field mounted control devices.

END OF SECTION
SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall hung water closets.
   2. Floor mount water closets.
   3. Urinals.
   4. Lavatories.
   5. Accessories.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME A112.6.1 - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
   2. ASME A112.18.1 - Plumbing Fixture Fittings.
   3. ASME A112.19.2M - Vitreous China Plumbing Fixtures.
   4. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks and Urinals.

1.3 SUBMITTALS

A. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
B. Samples: Manufacturer’s standard color selection charts.
C. Manufacturer's Installation Instructions: Submit installation methods and procedures.
D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
E. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

1.4 QUALITY ASSURANCE


1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
1.6 DELIVERY, STORAGE, AND HANDLING
   A. Accept fixtures on site in factory packaging. Inspect for damage.
   B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.7 EXTRA MATERIALS
   A. Furnish one set of each type faucet service kits, flush valve service kits, lavatory supply fittings, and toilet seats.

PART 2 PRODUCTS

2.1 WALL HUNG WATER CLOSETS (WC-1 and WC-2)
   A. Manufacturers:
      2. Eljer.
      4. Zurn.
      5. Substitutions: Not Permitted.
   B. Bowl: ASME A112.19.2M; **to coordinate with existing carrier to remain**; white, wall hung, siphon jet, ADA accessible, vitreous china closet bowl, designed for use with 1.6 gallon per flush valve, with elongated rim, 1-1/2 inch top spud, china bolt caps.
   C. Sensor Operated Flush Valve: ASME A112.18.1; exposed chrome plate, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated metal cover, vacuum breaker, 1.6 gallon flush volume. Coordinate flush valve installation height with ADA grab bar locations
      1. Manufacturers:
         a. Sloan; 8111-G2 Optima Plus Series.
         b. Zurn.
         c. Substitutions: Not Permitted.
   D. WC-1 Seat: Solid white anti-microbial plastic, elongated with open front and 1 to 1-1/4 inch risers, self-sustaining hinge, extended back, self-sustaining hinge, brass or stainless steel bolts, with cover.
   E. WC-2 Seat: Solid white anti-microbial plastic, elongated with open front, self-sustaining hinge, extended back, self-sustaining hinge, brass or stainless steel bolts, with cover.
   F. Carrier: Existing to remain.
2.2 FLOOR MOUNT WATER CLOSETS (WC-3 and WC-4)

A. Manufacturers:
   2. Eljer.
   4. Zurn.
   5. Substitutions: Not Permitted.

B. Bowl: ASME A112.19.2M; white, floor mount, siphon jet, ADA accessible, vitreous china closet bowl, designed for use with 1.6 gallon per flush valve, with elongated rim, 1-1/2 inch top spud, china bolt caps.

C. Sensor Operated Flush Valve: ASME A112.18.1; exposed chrome plate, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated metal cover, vacuum breaker, 1.6 gallon flush volume. Coordinate flush valve installation height with ADA grab bar locations
   1. Manufacturers:
      a. Sloan; 8111-G2 Optima Plus Series.
      b. Zurn.
      c. Substitutions: Not Permitted.

D. Seat: Solid white anti-microbial plastic, elongated with open front, self-sustaining hinge, extended back, self-sustaining hinge, brass or stainless steel bolts, with cover.

2.3 WALL HUNG URINALS (UR-1 & UR-2)

A. Manufacturers:
   1. Bowl:
      a. American Standard, 6501.010 Washbrook Series.
      b. Eljer, 161-2030 Correcto Series.
      c. Kohler, K-4960-ET Bardon Superior Series.
      d. Zurn, Z5750 Series.
      e. Substitutions: Not Permitted.
   2. Flush Valve:
      a. Sloan, 186-SMO Optima Series.
      b. Zurn.
      c. Substitutions: Not Permitted.

B. Urinal: ASME A112.19.2M; white vitreous china, ADA accessible, wall hung washout urinal with shields, integral trap, 3/4 inch top spud, steel supporting hanger.

C. Sensor Operated Flush Valve: ASME A112.18.1; exposed, chrome plated, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated plate, screwdriver stop and vacuum breaker; 1.0 gallon flush volume.

D. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.
2.4 LAVATORIES (LAV-1 & LAV-2)

A. Manufacturers:
   1. Bowl:
      b. Eljer.
      c. Kohler.
      d. Zurn.
      e. Substitutions: Not Permitted.
   2. Faucet:
      b. Delta, Approved equal.
      c. Substitutions: Not Permitted.

B. Vitreous China Wall Hung Basin: ASME A112.19.2M; white vitreous china, wall hung lavatory 20x18 inch minimum, center faucet hole, drilled for concealed arm carrier, rectangular basin with splash lip, front or rear overflow.

C. Electronic Metered Faucet: ASME A112.18.1; chrome plated metered, single tempered supply faucet with battery powered, solenoid operator and infrared sensor, single hole mounting design, 2.0-2.2 gpm laminar flow device, side mounted, ADA compliant, open grid strainer.

D. Accessories:
   1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
   2. Chrome plated, perforated open strainer.
   3. Chrome plated, wheel handle, quarter-turn stops.
   4. Rigid supplies.
   5. Pre-manufactured, ADA compliant, supply, trap and waste insulation kit. See LAVATORY INSULATION KIT, this specification section.

E. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.
   1. **Carrier shall be mounted to floor as per manufacturer’s instructions and shall also be rigidly supported back to existing masonry wall at each leg with additional, non-standard, materials.**

2.5 ALTERNATE BID LAVATORIES (LAV-3)

A. Manufacturers:
   1. Bowl:
      b. Eljer, 051-0121.
      c. Kohler, Approved equal.
      d. Zurn, Approved equal.
2. Faucet:
   b. Delta, Approved equal.
   c. Substitutions: Not Permitted.

B. Lavatory: ASME A112.19.2M; white vitreous china, self-rimming oval design, with 4 inch centered faucet holes, and front overflow.

C. Electronic Metered Faucet: ASME A112.18.1; chrome plated metered, single tempered supply faucet with battery powered, solenoid operator and infrared sensor, single hole mounting design, 2.0-2.2 gpm laminar flow device, side mounted, ADA compliant, open grid strainer.

D. Accessories:
   1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
   2. Chrome plated, perforated open strainer.
   3. Chrome plated, wheel handle, quarter-turn stops.
   4. Rigid supplies.
   5. Pre-manufactured, ADA compliant, supply, trap and waste insulation kit. See LAVATORY INSULATION KIT, this specification section.

2.6 LAVATORY INSULATION KIT

A. Manufacturers:
   1. Truebro.
   2. Plumberex.

B. Product Description: Safety Covers conforming to ANSI A177.1 and consisting of insulation kit of molded closed cell vinyl construction, 3/16 inch thick, white color, for insulating tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify walls and floor finishes are prepared and ready for installation of fixtures.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.
3.3 INSTALLATION


B. Install each fixture with trap, easily removable for servicing and cleaning.

C. Provide chrome plated rigid or flexible supplies to fixtures with wheel-handle, quarter-turn stops, reducers, and escutcheons.

D. Install components level and plumb.

E. Install and secure fixtures in place with wall supports, wall carriers and bolts.

F. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 00, color to match fixture.

G. Solidly attach floor mounted water closets to floor. Lead flashing is not intended to hold fixture in place.

H. For accessible water closets, install flush handle to wide side of stall or room.

I. Install piping insulation kits at all accessible lavatories and sinks.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Review toilet partition shop-drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Do not permit use of fixtures before final acceptance.
3.8 SCHEDULES

A. Fixture Mounting Heights:
   1. Wall Hung Water Closets:
      a. Accessible (WC-1): Mount to existing carrier with toilet seat with risers.
   2. Urinal:
      a. Accessible (UR-1): 17 inches to top of bowl rim.
   3. Lavatory:
      a. Accessible (LAV-1): 34 inches to top of basin rim.

END OF SECTION
SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Balancing Air Systems:

1.2 ACTION SUBMITTALS

1.3 INFORMATIONAL SUBMITTALS

A. Certified TAB reports.

1.4 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
G. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

H. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:
   a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
   b. Duct systems are complete with terminals installed.
   c. Fans are operating, free of vibration, and rotating in correct direction.
   d. Ceilings are installed.
   e. Windows and doors are installed.
   f. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Mark equipment and balancing devices, including damper-control positions and similar control devices, with paint or other suitable, permanent identification material to show final settings.

B. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

B. Check dampers for proper position to achieve desired airflow path.

C. Check for airflow blockages.

D. Verify that air duct system is sealed.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.
2. Measure fan static pressures.
3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust air inlets and outlets for each space to indicated airflows.

C. Verify final system conditions.

3.6 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check bearings and other lubricated parts for proper lubrication.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. Fans are clean.
2. Bearings and other parts are properly lubricated.
3. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed.
2. Verify that the indicated airflows of the renovated work result in fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.
3.7 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Inlets: Plus or minus 10 percent.

3.8 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Contractor's name and address.
7. Report date.
8. Signature of TAB supervisor who certifies the report.
9. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
10. Summary of contents including the following:
   a. Indicated versus final performance.
   b. Notable characteristics of systems.
   c. Description of system operation sequence if it varies from the Contract Documents.

11. Nomenclature sheets for each item of equipment.
12. Data for terminal units, including manufacturer's name, type, size, and fittings.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for fans and pump performance forms including the following:
   
a. Settings for exhaust-air dampers.
   b. Fan drive settings including settings and percentage of maximum pitch diameter.
   c. Other system operating conditions that affect performance.

D. Fan Test Reports: For exhaust fans, include the following:

1. Fan Data:
   
a. System identification.
   b. Location.
   c. Make and type.
   d. Model number and size.
   e. Manufacturer's serial number.
   f. Arrangement and class.
   g. Sheave make, size in inches (mm), and bore.
   h. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).

2. Motor Data:
   
a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches, and bore.
   f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
   g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):
   
a. Total airflow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Suction static pressure in inches wg.
E. Air-Terminal-Device Reports:

1. Unit Data:
   a. System and air-handling unit identification.
   b. Location and zone.
   c. Apparatus used for test.
   d. Area served.
   e. Make.
   f. Number from system diagram.
   g. Type and model number.
   h. Size.
      Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):
   i. Airflow rate in cfm.
   j. Air velocity in fpm.
   k. Preliminary airflow rate as needed in cfm.
   l. Preliminary velocity as needed in fpm.
   m. Final airflow rate in cfm.
   n. Final velocity in fpm.

END OF SECTION
SECTION 23 07 19 - HVAC PIPING INSULATION

1.1 SUMMARY

A. Section includes insulation for HVAC piping systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail attachment and covering of heat tracing inside insulation.
   3. Detail insulation application at pipe expansion joints for each type of insulation.
   4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   5. Detail removable insulation at piping specialties.
   6. Detail application of field-applied jackets.
   7. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS


B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C795.
E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate: Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C533, Type I.
   1. Prefabricated Fitting Covers: Comply with ASTM C450 and ASTM C585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

G. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Comply with ASTM C552.
   1. Preformed Pipe Insulation: Type II, Class 1, without jacket.
   2. Preformed Pipe Insulation: Type II, Class 2, with factory-applied ASJ or ASJ-SSL jacket.
   3. Factory fabricate shapes in accordance with ASTM C450 and ASTM C585.

H. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C534/C534M, Type I for tubular materials, Type II for sheet materials.

I. Mineral-Fiber, Preformed Pipe: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C547.
   1. Preformed Pipe Insulation: Type I, Grade A without factory-applied jacket
   2. 850 deg F.
   3. Factory fabricate shapes in accordance with ASTM C450 and ASTM C585.

   1. Semirigid board material with factory-applied ASJ or FSK jacket.
   2. Nominal density is 2.5 lb/cu. ft. or more.
   3. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less.

   1. Preformed Pipe Insulation: Type III without factory-applied jacket or with factory-applied ASJ.
   2. Factory fabricate shapes in accordance with ASTM C450 and ASTM C585.
   3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

   1. Preformed insulation without factory-applied jacket or with factory-applied ASJ or with factory-applied ASJ-SSL or with field-applied PVDC jacket or with field-applied PVDC-SSL.
   2. Type IV, except thermal conductivity (k-value) shall not exceed 0.19 Btu x in./h x sq. ft. x deg F at 75 deg F after 180 days of aging.
   3. Flame-spread index shall be 25 or less, and smoke-developed index shall be 50 or less for thicknesses of up to 1 inch as tested in accordance with ASTM E84.

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4. Fabricate shapes in accordance with ASTM C450 and ASTM C585.
5. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

M. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C534/C534M or ASTM C1427, Type I, Grade 1, for tubular materials and with Type II, Grade 1, for sheet materials.

N. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed 0.26 Btu x in./h x sq. ft. x deg F after 180 days of aging. Fabricate shapes in accordance with ASTM C450 and ASTM C585.

2.2 INSULATING CEMENTS

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C196.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.

C. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

D. Phenolic and Polyisocyanurate Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

E. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.
   1. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less as tested in accordance with ASTM E84.
   2. Wet Flash Point: Below 0 deg F.
   3. Service Temperature Range: 40 to 200 deg F.

F. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

G. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F.
H. ASJ Adhesive and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A, for bonding insulation jacket lap seams and joints.

I. PVC Jacket Adhesive: Compatible with PVC jacket.

2.4 MASTICS AND COATINGS

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.
   1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
   2. Service Temperature Range: 0 to plus 180 deg F.
   3. Comply with MIL-PRF-19565C, Type II, for permeance requirements with supplier listing on DOD QPD - Qualified Products Database.
   4. Color: White or as approved by Architect

C. Vapor-Retarder Mastic, Solvent Based, Indoor Use: Suitable for indoor use on below-ambient services.
   1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
   2. Service Temperature Range: 0 to 180 deg F.
   3. Color: White or as approved by Architect

D. Vapor-Retarder Mastic, Solvent Based, Outdoor Use: Suitable for outdoor use on below-ambient services.
   1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
   2. Service Temperature Range: Minus 50 to plus 220 deg F.
   3. Color: White or as approved by Architect

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
   1. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm at manufacturer's recommended dry film thickness.
   2. Service Temperature Range: 0 to plus 180 deg F or Minus 20 to plus 180 deg F.
   3. Color: White or as approved by Architect

2.5 LAGGING ADHESIVES

A. Adhesives shall comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
   1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
   2. Service Temperature Range: 20 to plus 180 deg or 0 to plus 180 deg F.
   3. Color: White or as approved by Architect

2.6 SEALANTS

A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.
B. Joint Sealants:
   1. Permanently flexible, elastomeric sealant.
      a. Service Temperature Range: Minus 150 to plus 250 deg F or Minus 100 to plus 300 deg F.
      b. Color: White or as approved by Architect.

C. FSK and Metal Jacket Flashing Sealants:
   1. Fire- and water-resistant, flexible, elastomeric sealant.
   2. Service Temperature Range: Minus 40 to plus 250 deg F.
   3. Color: Approved by Architect

D. ASJ Flashing Sealants and PVDC and PVC Jacket Flashing Sealants:
   1. Fire- and water-resistant, flexible, elastomeric sealant.
   2. Service Temperature Range: Minus 40 to plus 250 deg F.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
   1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
   2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
   3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd.

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C1136, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
   1. Adhesive: As recommended by jacket material manufacturer.
   2. Color: [White] [Color-code jackets based on system. Color as selected by Architect].
   3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
      a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:
      a. [Sheet and roll stock ready for shop or field sizing] [Factory cut and rolled to size].
      b. Finish and thickness are indicated in field-applied jacket schedules.
      c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper or 3-mil- thick, heat-bonded polyethylene and kraft paper or 2.5-mil- (0.063-mm-) thick polysurlyn.
      d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper or 2.5-mil- thick polysurlyn.
      e. Factory-Fabricated Fitting Covers:
         1) Same material, finish, and thickness as jacket.
         2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
         3) Tee covers.
         4) Flange and union covers.
         5) End caps.
         6) Beveled collars.
         7) Valve covers.
         8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

   2. Stainless-Steel Jacket: ASTM A240/A240M.
      a. Sheet and roll stock ready for shop or field sizing or Factory cut and rolled to size.
      b. Material, finish, and thickness are indicated in field-applied jacket schedules.
      c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper or 3-mil- thick, heat-bonded polyethylene and kraft paper or 2.5-mil- thick polysurlyn.
      d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper or 2.5-mil- thick polysurlyn.
      e. Factory-Fabricated Fitting Covers:
         1) Same material, finish, and thickness as jacket.
         2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
         3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Self-Adhesive Outdoor Jacket: 60-mil- thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a cross-laminated polyethylene film covered with white or stucco-embossed aluminum-foil facing.

F. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested in accordance with ASTM E96/E96M and with a flame-spread index of 10 and a smoke-developed index of 20 when tested in accordance with ASTM E84.

G. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms when tested in accordance with ASTM E96/E96M and with a flame-spread index of 25 and a smoke-developed index of 50 when tested in accordance with ASTM E84.


2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
1. Width: 3 inches
2. Thickness: 11.5 mils
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.
1. Width: 3 inches (75 mm)
2. Thickness: 6.5 mils (0.16 mm)
3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
   1. Width: 2 inches (50 mm)
   2. Thickness: 6 mils (0.15 mm).
   3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
   4. Elongation: 500 percent.
   5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
   1. Width: 2 inches (50 mm).
   2. Thickness: 3.7 mils (0.093 mm).
   3. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
   4. Elongation: 5 percent.
   5. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

E. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
   1. Width: 3 inches (75 mm).
   2. Film Thickness: 2 mils (0.05 mm).
   3. Adhesive Thickness: 1.5 mils (0.04 mm).
   4. Elongation at Break: 120 percent.
   5. Tensile Strength: 20 psi (138 kPa) in width.

F. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
   1. Width: 3 inches (75 mm).
   2. Film Thickness: 6 mils (0.15 mm).
   3. Adhesive Thickness: 1.5 mils (0.04 mm).
   4. Elongation at Break: 145 percent.
   5. Tensile Strength: 55 psi (379 kPa) in width.

2.12 SECUREMENTS

A. Bands:
   1. Stainless Steel: ASTM A240/A240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) or 3/4 inch (19 mm) wide with wing seal or closed seal.
   2. Aluminum: ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) or 3/4 inch (19 mm) wide with wing seal or closed seal.
   3. Springs: Twin spring set constructed of stainless steel, with ends flat and slotted to accept metal bands. Spring size is determined by manufacturer for application.

B. Staples: Outward-clinching insulation staples, nominal 3/4 inch (19 mm) wide, stainless steel or Monel.

C. Wire: 0.080-inch (2.0-mm) nickel-copper alloy or 0.062-inch (1.6-mm) soft-annealed, stainless steel or 0.062-inch (1.6-mm) soft-annealed, galvanized steel.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

   1. Verify that systems to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

   1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
   2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation in compliance with applicable Mechanical Code and Energy Conservation code.

B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.
D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

F. Install multiple layers of insulation with longitudinal and end seams staggered.

G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

H. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.

I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

J. Install insulation with least number of joints practical.

K. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

M. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches (50 mm) or 4 inches (100 mm) o.c.
   a. For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

N. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.

O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

Q. For above-ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
   4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
   4. Seal jacket to wall flashing with flashing sealant.
D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
   1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:
   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as that of adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions using a section of oversized preformed pipe insulation to fit. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CALCIUM SILICATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless steel bands at 12-inch (300-mm) intervals, and tighten bands without deforming insulation materials.
2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless steel bands at 12-inch (300-mm) intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch (25 mm). Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as that of pipe insulation.
4. Finish flange insulation same as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2. Install insulation to flanges as specified for flange insulation application.
3. Finish valve and specialty insulation same as pipe insulation.

3.7 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.
B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as that of pipe insulation.
   4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
   2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of cellular-glass insulation to valve body.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.

3.8 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
   1. Install pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
   4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install mitered sections of pipe insulation.
   2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as that of pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.9 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
   2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
   3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   4. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:
   1. Secure single-layer insulation with stainless steel bands at 12-inch (300-mm) intervals, and tighten bands without deforming insulation materials.
   2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with 0.062-inch (1.6-mm) wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless steel bands at 12-inch (300-mm) intervals.

B. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
   2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
   3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
   4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as that of pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed insulation sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.
E. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed insulation sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.

3.11 INSTALLATION OF POLYISOCYANURATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
   2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic.
   3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, and same thickness as that of adjacent pipe insulation, not to exceed 1-1/2-inch (38-mm) thickness.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as that of pipe insulation.

C. Insulation Installation on Fittings and Elbows:
   1. Install preformed sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of polyisocyanurate insulation to valve body.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.
3.12 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
   1. Install pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as that of pipe insulation.
   4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install mitered sections of polyolefin pipe insulation.
   2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.
   4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.13 INSTALLATION OF POLYSTYRENE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
   2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic.
   3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, and make thickness same as that of adjacent pipe insulation, not to exceed 1-1/2-inch (38-mm).
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness that of as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed insulation sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed section of polystyrene insulation to valve body.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.

3.14 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
   1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
   2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
   3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:
   1. Draw jacket material smooth and tight.
   2. Install lap or joint strips with same material as jacket.
   3. Secure jacket to insulation with manufacturer's recommended adhesive.
   4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
   5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated and for horizontal applications, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
   1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches (300 mm) o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap factory-presized jackets around individual pipe insulation sections, with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches (50 mm) over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches (850 mm) or less. The 33-1/2-inch- (850-mm-) circumference limit allows for 2-inch- (50-mm-) overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.15 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless steel jackets.

3.16 PIPING INSULATION SCHEDULE, GENERAL

A. Insulation conductivity and thickness per pipe size shall comply with schedules in this Section or with requirements of authorities having jurisdiction, whichever is more stringent.

B. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
C. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Underground piping.
2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.17 INDOOR PIPING INSULATION SCHEDULE

A. Fluid Operating Temperature Range below 40 Deg F:
  1. Minimum insulation thickness with k value 0.20-0.26 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 1 inch: 1/2 inches thick.
     b. NPS 1 inch to less than 8 inches: 1 inch thick.
     c. NPS 8 inches or greater: 1 1/2 inch thick.

B. Fluid Operating Temperature from 40 Deg F to 60 deg F:
  1. Minimum insulation thickness with k value 0.21-0.27 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 1 1/2 inches: 1/2 inches thick.
     b. NPS 1 1/2 inches or greater: 1 inch thick.

C. Fluid Operating Temperature from 105 Deg F to 140 deg F:
  1. Minimum insulation thickness with k value 0.21-0.28 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 1 1/2 inches: 1 inches thick.
     b. NPS 1 1/2 inches or greater: 1-1/2 inches thick.

D. Fluid Operating Temperature from 141 Deg F to 200 deg F:
  1. Minimum insulation thickness with k value 0.25-0.29 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 1 1/2 inches: 1-1/2 inches thick.
     b. NPS 1 1/2 inches or greater: 2 inches thick.

E. Fluid Operating Temperature from 201 Deg F to 250 deg F:
  1. Minimum insulation thickness with k value 0.27-0.30 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 4 inches: 2-1/2 inches thick.
     b. NPS 4 inches or greater: 3 inches thick.

F. Fluid Operating Temperature from 251 Deg F to 350 deg F:
  1. Minimum insulation thickness with k value 0.29-0.32 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 1 inch: 3 inches thick.
     b. NPS 1 inch to less than 1-1/2 inches: 4 inches thick.
     c. NPS 1-1/2 inches and greater: 4-1/2 inches thick.

G. Fluid Operating Temperature from greater than 350 deg F:
  1. Minimum insulation thickness with k value 0.32-0.34 ((Btu*in)/(h*ft²*F)):
     a. NPS less than 1 inch: 4-1/2 inches thick.
     b. NPS 1 inch and greater: 5 inches thick.

H. For insulation outside the state conductivity range, the minimum thickness (T) shall be as follows
  1. \[ T = \frac{r}{(1+t/r)K/k-1} \]
     a. T = minimum insulation thickness
     b. r = actual outside radius of pipe

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c. \( t \) = insulation thickness listed for applicable fluid temperature and pipe size

d. \( K \) = conductivity of alternate material at mean rating temperature indicate for the
   applicable fluid temperature

e. \( k \) = the upper value of the conductivity range listed in the table for the applicable
   fluid temperature

3.18 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the
   field-applied jacket over the factory-applied jacket.

B. Install jackets where required by applicable mechanical code

C. If more than one material is listed, selection from materials listed is Contractor's option.

D. Piping, Concealed:

1. None.
2. PVC or PVC, Color-Coded by System: 20 mils (0.5 mm) or 30 mils (0.8 mm) thick.
3. Aluminum, Smooth or Corrugated or Stucco Embossed: 0.016 inch (0.41 mm) or 0.020
   inch (0.51 mm) or 0.024 inch (0.61 mm) or 0.032 inch (0.81 mm) or 0.040 inch (1.0 mm)
   thick.
4. Painted Aluminum, Smooth or Corrugated or Stucco Embossed: 0.016 inch (0.41 mm) or
   0.020 inch (0.51 mm) or 0.024 inch (0.61 mm) or 0.032 inch (0.81 mm) thick.
5. Stainless Steel, Type 304 or Type 316, Smooth No. 2B Finish or Corrugated or Stucco
   Embossed: 0.010 inch (0.25 mm) or 0.016 inch (0.41 mm) or 0.020 inch (0.51 mm) or
   0.024 inch (0.61 mm) thick.

E. Piping, Exposed:

1. None.
2. PVC or PVC, Color-Coded by System: 20 mils (0.5 mm) or 30 mils (0.8 mm) thick.
3. Aluminum, Smooth or Corrugated or Stucco Embossed: 0.016 inch (0.41 mm) or 0.020
   inch (0.51 mm) or 0.024 inch (0.61 mm) or 0.032 inch (0.81 mm) or 0.040 inch (1.0 mm)
   thick.
4. Painted Aluminum, Smooth or Corrugated or Stucco Embossed: 0.016 inch (0.41 mm) or
   0.020 inch (0.51 mm) or 0.024 inch (0.61 mm) or 0.032 inch (0.81 mm) thick.
5. Stainless Steel, Type 304 or Type 316, Smooth No. 2B Finish or Corrugated or Stucco
   Embossed: 0.010 inch (0.25 mm) or 0.016 inch (0.41 mm) or 0.020 inch (0.51 mm) or
   0.024 inch (0.61 mm) thick.

END OF SECTION
SECTION 23 21 13 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Copper tube and fittings.
2. Steel pipe and fittings.
4. Transition fittings.
5. Dielectric fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Pipe.
2. Fittings.

B. Delegated-Design Submittal:

1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
2. Locations of pipe anchors and alignment guides and expansion joints and loops.
3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.
4. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Piping layout, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Other building services.
3. Structural members.

B. Qualification Data: For Installer.

C. Field quality-control reports.
D. Preconstruction Test Reports:
   1. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installers of Pressure-Sealed Joints: Installers shall be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
   2. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP shall be certified by manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.

B. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
   1. Hot-Water Heating Piping: 100 psig (689 kPa) at 200 deg F (93 deg C) as design standard. Verify existing conditions before installation.
   2. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L (ASTM B 88M, Type B) or ASTM B 88, Type M (ASTM B 88M, Type C).

B. Annealed-Temper Copper Tubing: ASTM B 88, Type K (ASTM B 88M, Type A).

C. DWV Copper Tubing: ASTM B 306, Type DWV.
   1. Grooved-End Copper Fittings: ASTM B 75 (ASTM B 75M), copper tube or ASTM B 584, bronze casting.
   2. Grooved-End-Tube Couplings: Rigid pattern unless otherwise indicated; gasketed fitting. Ductile-iron housing with keys matching pipe and fitting grooves, EPDM gasket rated for minimum 230 deg F (110 deg C) for use with housing, and steel bolts and nuts.

E. Copper or Bronze Pressure-Seal Fittings:
   1. Housing: Copper.
   2. O-Rings and Pipe Stops: EPDM.
   3. Tools: Manufacturer's special tools.
   4. Minimum 200-psig (1379-kPa) working-pressure rating at 250 deg F (121 deg C).

F. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube.

G. Wrought-Copper Unions: ASME B16.22.

2.3 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in "Piping Applications" Article.


D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.

E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in "Piping Applications" Article.

F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

G. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   2. End Connections: Butt welding.
   3. Facings: Raised face.

H. Grooved Mechanical-Joint Fittings and Couplings:
   1. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106/A 106M, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
2. Couplings: Ductile- or malleable-iron housing and EPDM or nitrile gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

I. Plain-End Mechanical-Joint Couplings:
1. Housing: ASTM A-536 Grade 65-45-12 segmented ductile iron or type 304 stainless steel.
2. Housing coating: None
3. Gasket: EPDM or NBR.
4. Sealing Mechanism: Double-lip sealing system or carbon steel case-hardened jaws.
5. Bolts, hex nuts, washers, or lock bars based on manufacturer's design.
6. Minimum Pressure Rating: Equal to that of the joined pipes.

J. Steel Pressure-Seal Fittings:
1. Housing: Steel.
2. O-Rings and Pipe Stop: EPDM.
3. Tools: Manufacturer's special tool.
4. Minimum 300-psig (2070-kPa) working-pressure rating at 230 deg F (110 deg C).

K. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless otherwise indicated.
      a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
      b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

F. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Plastic-to-Metal Transition Fittings:
   1. One-piece fitting with one threaded brass or copper insert and one solvent-cement-joint end of material and wall thickness to match plastic pipe material.
H. Plastic-to-Metal Transition Unions:
   1. Brass or copper end, solvent-cement-joint end of material and wall thickness to match plastic pipe material, rubber gasket, and threaded union.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
   1. Description:
      b. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C) or 150 psig (1035 kPa) or 250 psig (1725 kPa)
      c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
   1. Description:
      b. Factory-fabricated, bolted, companion-flange assembly.
      c. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C) or 150 psig (1035 kPa) or 175 psig (1200 kPa) or 300 psig (2070 kPa)
      d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:
   1. Description:
      a. Nonconducting materials for field assembly of companion flanges.
      b. Pressure Rating: 150 psig (1035 kPa)
      c. Gasket: Neoprene or phenolic.
      d. Bolt Sleeves: Phenolic or polyethylene.
      e. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:
   1. Description:
      b. Electroplated steel nipple, complying with ASTM F 1545.
      c. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C)
      d. End Connections: Male threaded or grooved.
      e. Lining: Inert and noncorrosive, propylene.
PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 (DN 50) and smaller shall be any of the following:
   1. Type L (Type B) or Type M (Type C), drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed or pressure-seal joints.
   2. Schedule 40 or Schedule 30 or Schedule 20, Grade B steel pipe; Class 125, cast-iron or Class 150, malleable-iron or Class 250, cast-iron or Class 300, malleable-iron fittings; cast-iron flanges and flange fittings; and threaded joints.
   3. Schedule 5 steel pipe; steel, pressure-seal couplings and fittings; and pressure-seal joints.
   4. Schedule 40 or Schedule 80 CPVC plastic pipe and fittings and solvent-welded joints.
   5. Alternate materials must be approved.

B. Hot-water heating piping, aboveground, NPS 2-1/2 (DN 65) and larger, shall be any of the following:
   1. Type L (Type B) or Type M (Type C), drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
   2. Schedule 40 or Schedule 30 or Schedule 20 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
   3. Schedule 40 or Schedule 30 or Schedule 20 steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
   5. Schedule 40 or Schedule 80 CPVC plastic pipe and fittings and solvent-welded joints.
   6. RTRP and RTRF with adhesive or flanged joints.
   7. Alternative materials must be approved.

C. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
E. Install piping to permit valve servicing.
F. Install piping at indicated slopes.
G. Install piping free of sags and bends.
H. Install fittings for changes in direction and branch connections.
I. Install piping to allow application of insulation.
J. Select system components with pressure rating equal to or greater than system operating pressure.
K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
L. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
O. Install branch connections to mains using mechanically formed tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
P. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
Q. Install flanges in piping, NPS 2-1/2 (DN 65) and larger, at final connections of equipment and elsewhere as indicated.
R. Install shutoff valve immediately upstream of each dielectric fitting.

3.3 DIELECTRIC FITTING INSTALLATION
A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples or unions.
C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100) Use dielectric flanges or flange kits or nipples.
D. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.
3.4 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

C. Install the following pipe attachments:
   1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet (6 m) long.
   2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet (6 m) or longer.
   3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
   4. Spring hangers to support vertical runs.
   5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
   6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

D. Install hangers for copper tubing and steel piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

E. Install hangers for plastic piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

F. Install hangers for fiberglass piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

G. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

H. Support vertical runs of copper tubing and steel piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

I. Support vertical runs of fiberglass piping to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join ASTM D 1785 schedule number, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule number PVC pipe and socket fittings according to ASTM D 2855.
4. PVC Nonpressure Piping: Join according to ASTM D 2855.

I. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

J. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.

K. Plain-End Mechanical-Coupled Joints: Prepare, assemble, and test joints in accordance with manufacturer's written installation instructions.

L. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

M. Pressure-Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.
3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Section 230519 "Meters and Gages for HVAC Piping."

3.7 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
   1. Leave joints, including welds, uninsulated and exposed for examination during test.
   2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
   3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
   4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
   5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:
   1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
   2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
   3. Isolate expansion tanks and determine that hydronic system is full of water.
   4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
   5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
   6. Prepare written report of testing.
C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION
SECTION 23 31 13 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Single-wall rectangular ducts and fittings.
   2. Sheet metal materials.
   3. Hangers and supports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.

B. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
   1. Construct ducts of galvanized sheet steel unless otherwise indicated.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.
   1. Galvanized Coating Designation: G60.
   2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

D. Tie Rods: Galvanized steel, 1/4 inch minimum diameter for lengths 36 inches or less; 3/8 inch minimum diameter for lengths longer than 36 inches.

2.4 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory or shop fabricated fittings for changes in direction, size, and shape and for branch connections.
E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

J. Elbows: Use long-radius elbows wherever they fit.
   1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.

K. Branch Connections: Use lateral or conical branch connections.

3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Where practical, install concrete inserts before placing concrete.
   2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
   3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 CONNECTIONS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.
3.4 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use duct cleaning methodology as indicated in NADCA ACR.

C. Clean the following components by removing surface contaminants and deposits:
   1. Air outlets and inlets (registers, grilles, and diffusers).
   2. Exhaust fans including fan housings, scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
   3. Air ducts, dampers, actuators, and turning vanes.
   4. Dedicated exhaust components.

D. Mechanical Cleaning Methodology:
   1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
   2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
   3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.

3.5 STARTUP

A. Air Balance: Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Centrifugal exhaust fans.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes.
6. Fan speed controllers.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fans, include manufacturer’s published operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled by a qualified testing agency, and marked for intended location and application.

B. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans in accordance with AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
C. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA 210/ASHRAE 51, "Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating."

D. ASHRAE Compliance:
   1. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

2.2 CENTRIFUGAL FANS

A. Ratings: See schedule on drawings.

B. Description: Roof Mounted on curb, centrifugal exhaust fan. Belt or Direct drive as specified

C. Fan Wheel: Backward inclined centrifugal type.

D. Motor and Drive Mounting: Out of air stream.

E. Motor: Open drip-proof type mounted on vibration isolators.

F. Bearings: ABMA 9 life at 200,000 hours.

G. Accessories:
   1. Belt guard.
   2. Motor cover.
   3. Disconnect switch: NEMA 250 Type 1.
   4. Flanged inlet and outlet.
   5. Fan speed controller.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fans level and plumb.

B. Install fans in accordance with manufacturer’s instructions.

C. Install units with adequate clearances for service and maintenance.

D. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

E. Verify existing conditions compatible with new fans
3.2 ELECTRICAL CONNECTIONS
A. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.
B. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

3.3 ADJUSTING
A. Adjust damper linkages for proper damper operation.
B. Adjust exhaust fans to function properly
C. Adjust belt tension.
D. Lubricate bearings.
E. Adjust drive for final system balancing
F. Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC."

3.4 CLEANING
A. Clean as recommended by manufacturer. Do not use material or methods which may damage finish surface or surrounding construction

3.5 PROTECTION
A. Protect installed product and finished surfaces from damage during construction
B. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion

END OF SECTION
SECTION 23 37 13.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Rectangular and square diffusers.

B. Related Requirements:
   1. Section 23 37 13.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
   2. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples for Initial Selection: For diffusers with factory-applied color finishes.

C. Samples for Verification: For diffusers, in manufacturer's standard sizes to verify color selected.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Ceiling suspension assembly members.
   2. Method of attaching hangers to building structure.
   3. Size and location of initial access modules for acoustical tile.
   4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
   5. Duct access panels.

B. Source quality-control reports.
PART 2 - PRODUCTS

2.1 RECTANGULAR AND SQUARE DIFFUSERS

A. Devices shall be specifically designed for variable-air-volume flows.

B. Material: Aluminum.

C. Finish: Baked enamel, color selected by Architect / Engineer.

D. Face Size: 24 by 24 inches.

E. Face Style: Three cone.

F. Mounting: T-bar.

G. Pattern: Fixed.

H. Dampers: Radial opposed blade.

I. Accessories:
   1. Equalizing grid.
   2. Plaster ring.
   4. Wire guard.
   5. Sectorizing baffles.
   6. Operating rod extension.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fixed face grilles.

B. Related Requirements:
   1. Section 23 37 13.13 "Air Diffusers" for various types of air diffusers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
   2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples: For each exposed product and for each color and texture specified. Smallest size register and grille indicated.

C. Samples for Initial Selection: For registers and grilles with factory-applied color finishes. Smallest size register and grille indicated.

D. Samples for Verification: For registers and grilles, in manufacturer's standard sizes to verify color selected. Smallest size register and grille indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Ceiling suspension assembly members.
   2. Method of attaching hangers to building structure.
   3. Size and location of initial access modules for acoustical tile.
   4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
   5. Duct access panels.

B. Source quality-control reports.
PART 2 - PRODUCTS

2.1 GRILLES

A. Aluminum Fixed Face Grille:
   1. Finish: Baked enamel, color selected by Architect / Engineer.
   2. Face Blade Arrangement: Egg Crate style spaced 1/2 inch apart.
   3. Face Arrangement: Square
   4. Frame: 1 inch wide.
   5. Mounting: Lay in.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Radiant heating system.

B. Manufacturer-supported system startup and commissioning phase support.

1.2 RELATED SECTIONS

A. Section 23 21 13 - Hydronic Piping.

1.3 REFERENCES

A. ASTM International (ASTM):

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Provide manufacturer's product submittal data, including pressure and temperature rating, oxygen-barrier performance, and fire-performance characteristics.

C. Shop Drawings: Submit the following piping layouts, calculations and reports.
   1. Submit manufacturer's detailed drawings showing layouts, fixing details and piping details of all areas where hydronic radiant systems are indicated. Submit a cross-referenced manifold schedule indicating loop lengths, tubing diameter, flow rate, operating water temperatures, and pressure drop to meet the required performance listed on the contract documents along with product and performance data for each component.

   2. Indicate all valves, pumps and items of equipment that are required to control and operate the hydronic radiant system as shown on the plans and described in the sequence of operations. Submit a valve and pump schedule listing each number, type, size, model and service. Cross reference to supporting product data.

   3. Provide calculations that support the heating and cooling performance requirements of the hydronic radiant system. These calculations shall indicate the slab construction and the depth of the tubing in relation to the exposed surface. Calculations must show the required flow rate, operating temperatures and pressure drops through the system.
4. Submit manifold details, including all connections, fittings, valves and mounting requirements.
5. Submit details for embedded tubing through concrete expansion joints.
6. Provide drawings showing piping manifold locations and installation details.
7. Provide control sequences and requirements for control hardware devices. Indicate compliance and coordination with requirements of other specification sections.
8. Provide piping sample with complete print stream indicating certification of properties.

D. Operation and Maintenance Data: Provide operation and maintenance manuals for valves, manifolds, and controls.

E. Closeout Documentation:
1. Submit manufacturer's report detailing that the hydronic radiant system has been installed in accordance with the contract documents and the manufacturer's specified instructions. Provide manufacturer's instructions. Note any exceptions.
2. Submit start-up report demonstrating that system meets required capacity, is fully functional and commissioned to the satisfaction of system manufacturer.
3. Provide final as-built drawings indicating tubing layout, manifold locations, zoning and manifold schedules with details required for installation of the system.
4. Provide documentation indicating that the installer is trained to install the manufacturer's products.
5. Warranty documents specified herein

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall have demonstrated experience on projects of similar size and complexity with documentation proving successful completion of hydronic radiant system installation and/or training by the PEX tubing manufacturer.

B. Hydronic radiant system manufacturer shall have successfully completed five installations of similar type and scope. Manufacturer shall provide a representative for field support during the installation and commissioning of the hydronic radiant system.

C. Pre-installation Meetings:
1. Verify project requirements, substrate conditions, floor coverings, manufacturer's installation instructions and warranty requirements.
2. Review project construction timeline to ensure compliance or discuss modifications as required.
3. Interface with other trade representatives to verify areas of responsibility.
4. Establish the frequency and construction phase the project engineer intends for site visits and inspections by the PEX tubing manufacturer's representative

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirements Section.

B. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
   1. Store PEX tubing in cartons or under cover to avoid dirt or foreign material from entering the tubing.
   2. Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, cover the tubing to prevent exposure to direct sunlight.

1.7 WARRANTY
   A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
   B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

PART 2 PRODUCTS

2.1 MANUFACTURERS
   A. Acceptable Manufacturer: Sterling, Trane, or approved equivalent
   B. Substitutions: Must be approved
   C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 Modular Radiant Heating Panel
   A. Heating Panels (Sterling as design standard)
      1. 2’x2’ or size that matches new ceiling grid
      2. Pipework: Serpentine pipe coil 5/8” OD tubing.
      3. Panels: 0.040” Aluminum or 0.027” Steel sheet
      4. Paint Finish: Standard finish to match adjacent acoustic ceiling tiles
      5. Contact Strips: Aluminum heat saddle bolted to the back of panel using steel or aluminum studs
      6. Insulation: Minimum 1” thick foil back batt insulation or approved equivalent

2.3 CONTROLS
   A. Wall Mounted Thermostat
      1. Adjustable Temperature Setting
      2. Heating On/Off
      3. Current Temperature Reading
      4. Location: At or near existing thermostat location. See Mechanical/Coordination drawing for final location.
PART 3 EXECUTION

3.1 EXAMINATION
   A. Site Verification of Conditions: Verify that site conditions are acceptable for installation of
      the hydronic radiant system. Do not proceed with installation of the hydronic radiant system
      until unacceptable conditions are corrected.

3.2 INSTALLATION
   A. Install radiant system according to approved shop drawings or coordination drawings.
   B. Add piping necessary to connect to existing hot water piping system.
   C. Comply with manufacturer's product data, including product technical bulletins, installation
      instructions and design drawings, including the following.
   D. Suspended Ceiling Installation
      1. Suspend all panels in ceiling grid as per manufacturer’s requirements.
   E. All piping to be identified with loop numbers marked on pipe wall before connecting to
      manifold using a permanent tag. Verify actual loop length for each loop on a manifold. All
      loops shall be identified to allow for future balancing.

3.3 ADJUSTING
   A. Balancing Loops Across the Manifold:
      1. Balance all loops across each manifold to the flow rates specified on the approved
         manifold schedule.
      2. Balancing is unnecessary when all loop lengths across the manifold are within 3% of
         each other in length. Install the supply-and-return piping to the manifold in a reverse-
         return configuration to ensure self-balancing.

3.4 CLEANING/RECYCLING
   A. Remove temporary coverings and protection.
   B. Repair or replace damaged installed products.
   C. Clean installed products in accordance with manufacturer's instructions prior to Owner's
      acceptance.
   D. Remove construction debris from project site and legally dispose of debris. Divert waste
      tubing and packaging for recycling

END OF SECTION
SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY
A. Section includes building wire and cable and wiring connectors and connections.
B. Related Sections:

1.2 REFERENCES
A. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION
A. Product Requirements: Provide products as follows:
   1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
   2. Stranded conductors for control circuits.
   3. Conductor not smaller than 12 AWG for power and lighting circuits.
   4. Conductor not smaller than 16 AWG for control circuits.
   5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
B. Wiring Methods: Provide the following wiring methods:
   1. Exterior Locations: Use only building wire, Type THHN/THWN XHHW insulation, in raceway.

1.4 DESIGN REQUIREMENTS
A. Conductor sizes are based on copper.

1.5 SUBMITTALS
A. Division 01 - Submittal Procedures: Requirements for submittals.
B. Product Data: Submit for building wire and each cable assembly type.
C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
D. Test Reports: Indicate procedures and values obtained.
1.6 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

PART 2 PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers:
   1. AETNA
   2. American Insulated Wire Corp.
   3. Colonial Wire
   4. Encore Wire
   5. General Cable Co.
   6. Republic Wire
   7. Rome Cable
   8. Service Wire Co.
   9. Southwire
   10. Superior Essex

B. Product Description: Single conductor insulated wire.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 volts.

E. Insulation Temperature Rating: 75 degrees C.

F. Insulation Material: Thermoplastic

2.2 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.
3.2 PREPARATION
   A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK
   A. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.
   B. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION
   A. Route wire and cable to meet Project conditions.
   B. Neatly train and lace wiring inside equipment.
   C. Special Techniques--Building Wire in Raceway:
      1. Pull conductors into raceway at same time.
      2. Install building wire 4 AWG and larger with pulling equipment.
   D. Special Techniques - Wiring Connections:
      1. Clean conductor surfaces before installing lugs and connectors.
      2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
      3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
      4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
      5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
      6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.5 FIELD QUALITY CONTROL
   A. Inspect and test in accordance with NETA ATS, except Section 4.
   B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.END OF SECTION
SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Wire.

1.2 REFERENCES
A. Institute of Electrical and Electronics Engineers:
   2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE
A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

PART 2 PRODUCTS

2.1 WIRE
A. Material: Stranded copper.
B. Grounding Electrode Conductor: Copper conductor bare.
C. Bonding Conductor: Copper conductor bare.

PART 3 EXECUTION

3.1 PREPARATION
A. Remove paint, rust, mill oils, surface contaminants at connection points.
3.2 EXISTING WORK
A. Modify existing grounding system to maintain continuity to accommodate renovations.
B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

3.3 INSTALLATION
A. Install in accordance with IEEE 142 & 1100
B. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
C. Permanently ground entire light and power system in accordance with NEC.
D. Accomplish grounding of electrical system by using insulated grounding conductor installed with branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
E. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
F. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL
A. Inspect and test in accordance with NETA ATS, except Section 4.
B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
C. Perform continuity testing in accordance with IEEE 142.
D. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION
SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY
A. Conduit and tubing, outlet boxes, and pull and junction boxes.

1.2 REFERENCES
A. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

1.3 SYSTEM DESCRIPTION
A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

1.4 DESIGN REQUIREMENTS
A. Minimum Raceway Size: ¾” inch unless otherwise specified.

1.5 SUBMITTALS
A. Division 01 - Submittal Procedures: Submittal procedures.
B. Product Data: Submit for the following:
   1. Electrical Metallic Tubing.
   2. Raceway fittings.
   3. Conduit bodies.
   4. Pull boxes.
C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

PART 2 PRODUCTS

2.1 ELECTRICAL METALLIC TUBING (EMT)
   A. Product Description: ANSI C80.3; galvanized tubing.
   B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression set screw indenter type.

2.2 OUTLET BOXES
   A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
      1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
   B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

2.3 PULL AND JUNCTION BOXES
   A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
   B. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
      1. Material: Galvanized cast iron or Cast aluminum.
      2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.1 EXISTING WORK
   A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
   B. Remove concealed abandoned raceway to its source.
   C. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.
   D. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.
E. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.2 INSTALLATION

A. Ground and bond raceway and boxes in accordance with the National Electric Code.

B. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.

E. Do not attach raceway to ceiling support wires or other piping systems.

F. Route exposed raceway parallel and perpendicular to walls.

G. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

H. Maintain clearance between raceway and piping for maintenance purposes.

I. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

J. Cut conduit square using saw or pipe cutter; de-burr cut ends.

K. Bring conduit to shoulder of fittings; fasten securely.

L. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch size.

M. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

N. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.

O. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

P. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
Q. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

3.4 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings. Specified in section for outlet device.

B. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

C. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

D. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

E. Do not fasten boxes to ceiling support wires or other piping systems.

3.5 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Interior luminaires and accessories.

1.2 SUBMITTALS

A. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.

B. Product Data: Submit dimensions, ratings, and performance data.

1.3 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

2. PRODUCTS

2.1 INTERIOR LUMINAIRES

A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

B. Fixtures shall have the specified color finish.

C. All fixtures shall be furnished complete with all the necessary mounting hardware to accommodate the type of mounting as indicated on the drawings for the specific fixture type.

D. Fixtures shall have a minimum 86 CRI.

E. Warranty
   1. Provide a five-year warranty on all interior light fixtures.
   2. Provide a ten-year warranty on all emergency ballasts.

2.2 LED LIGHTS

A. LED fixture and driver shall be as follows:
   1. Shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage) with no damage to the driver.
   2. Output shall be regulated to +/- 5% across published load range.
3. Shall have a power factor greater than 0.90 for primary application to 50% of full load rating.
4. Input current shall have a total harmonic distortion (THD) of less than 10% of full load rating.
5. Shall have a Class A sound rating.
6. Shall have a minimum operating temperature of -20°C (-4°F).
7. Shall tolerate sustained open circuit and short circuit output conditions without fail and auto-resetting without need for external fuses or trip devices.
8. Driver output ripple current shall be less than 15% measured peak-to-average, with ripple frequency > 100 Hz.
9. Driver performance requirements shall be met when operated to 50% of full load rating.
10. Driver shall be rated for damp and dry locations.
11. Driver shall have integral common mode and differential mode surge protection of 2.5 kV.
12. Driver shall have integral thermal foldback to reduce driver power above rated case temperature to protect the driver if temperatures reach unacceptable levels.
14. Driver shall incorporate an integral means of limiting surges to the LEDs.

3. EXECUTION

3.1 INSTALLATION

A. Support luminaires larger than 24 inches in any dimension independent of ceiling framing.
B. Locate recessed ceiling luminaires as indicated on Drawings.
C. Install recessed luminaires to permit removal from below.
D. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
E. Install clips to secure recessed grid-supported luminaires in place.
F. Install accessories furnished with each luminaire.
G. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
H. Ground and bond interior luminaires in accordance with Section 26 05 26.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.
3.3 ADJUSTING

A. Aim and adjust luminaires as required for optimum performance.

3.4 CLEANING

A. Remove dirt and debris from enclosures.
B. Clean photometric control surfaces as recommended by manufacturer.
C. Clean finishes and touch up damage.

END OF SECTION