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PROPOSAL TO SUBMIT A BID.

STATE OF DELAWARE
DEPARTMENT OF FACILITIES MANAGEMENT

CONTRACT #'S
TROOP 1 MC4506000035
TROOP 6 MC4506000042

SPECIFICATIONS
FOR

DELAWARE STATE POLICE
TROOPS 1 AND 6 - RENOVATIONS

at

TROOP 1
603 Philadelphia Pike
Wilmington, DE

TROOP6
3301 Kirkwood Highway
Wilmington, DE

PREPARED BY

DELAWARE ARCHITECTS, LLC
550 S. DUPONT BLVD., SUITE E
MILFORD, DELAWARE 19963

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RENOVATIONS**

**DA LLC No. 012-014
STATE No. MC4506000035**

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**DA LLC No. 012-014
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RENOVATIONS**

**DA LLC No. 012-014
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NOT USED

END OF SECTION

CANNOT BE USED FOR BIDDING.

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ADVERTISEMENT FOR BIDS

Sealed bids for **OMB/DFM Contract No. MC4506000035 – Delaware State Police Troop 1 and OMB/DFM Contract No. MC4506000042 – Delaware State Police Troop 6 – Building Renovations** will be received by the State of Delaware, Office of Management and Budget, Division of Facilities Management, in the reception area of the Facilities Management Office in the Thomas Collins Building, 540 S. DuPont Highway, Suite 1 (Third Floor), Dover, DE 19901 until 2:00 p.m. local time on Monday, September 9, 2013, at which time they will be publicly opened and read aloud in the Conference Room. Bidder bears the risk of late delivery. Any bids received after the stated time will be returned unopened.

Project involves the following:

Troop 1, 603 Philadelphia Pike, Wilmington, Delaware: removing and closing up outside public restrooms with appropriate repair work; remodeling bathroom area and turning into break room; building an ADA-accessible unisex restroom using part of the existing lobby and office area; installing new windows in the Auto Shop area; replacing the oil sand interceptor on the waste line leaving the garage area.

Troop 6, 3301 Kirkwood Highway, Wilmington, Delaware: repointing of all brick work on the main building, shop building and chimney; repairing all roof seams, flashing, coping, failing joints on main building and gas island canopy; re-securing roofing membrane on all roofs; redressing all CTI work on front deck to seal leaks as well as all steps front and back; replacing all windows in main troop with new thermo pane windows with tinted glass for energy savings; cleaning window and door shelf angles down to bare metal, prime and paint.

Attention is called to construction schedule as detailed in the Bid Documents.

A **MANDATORY** Pre-Bid Meeting will be held on Thursday, August 15, 2013, at 12:30 p.m. at Delaware State Police Troop 1, 603 Philadelphia Pike, Wilmington, Delaware, for the purpose of establishing the list of subcontractors and to answer questions. Representatives of each party to any Joint Venture must attend this meeting. **ATTENDANCE OF THIS MEETING IS A PREREQUISITE FOR BIDDING ON THIS CONTRACT.**

Sealed bids shall be addressed to the Division of Facilities Management, 540 S. DuPont Highway, Suite 1, Dover, DE 19901, Attn: Rich Glazeski. The outer envelope should clearly indicate: **"OMB/DFM CONTRACT NO. MC4506000035 – DELAWARE STATE POLICE TROOP 1 AND OMB/DFM CONTRACT NO. MC4506000042 – DELAWARE STATE POLICE TROOP 6 – BUILDING RENOVATIONS - SEALED BID - DO NOT OPEN."**

Contract documents may be obtained at the office of Delaware Architects, LLC, 550 S. DuPont Boulevard, Suite E, Milford, DE 19963, phone: (302) 491-6047 (please call ahead to confirm availability), upon receipt of \$25.00 per CD/non-refundable. Checks are to be made payable to "Delaware Architects, LLC".

Construction documents will be available for review at the following locations: Delaware Architects, LLC; Delaware Contractors Association; Associated Builders and Contractors.

Bidders will not be subject to discrimination on the basis of race, creed, color, sex, sexual orientation, gender identity or national origin in consideration of this award, and Minority Business Enterprises, Disadvantaged Business Enterprises, Women-Owned Business Enterprises and Veteran-Owned Business Enterprises will be afforded full opportunity to submit bids on this contract. Each bid must be accompanied by a bid security equivalent to ten percent of the bid amount and all additive alternates. The successful bidder must post a performance bond and payment bond in a sum equal to 100 percent of the contract price upon execution of the contract. The Owner reserves the right to reject any or all bids and to waive any informalities therein. The Owner may extend the time and place for the opening of the bids from that described in the advertisement, with not less than two calendar days notice by certified delivery, facsimile machine or other electronic means to those bidders receiving plans.

END OF ADVERTISEMENT FOR BIDS

CANNOT BE USED FOR BIDDING

INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

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2. BIDDER'S REPRESENTATION
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8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

CANNOT BE USED FOR BIDDING.

ARTICLE 1: GENERAL

1.1 DEFINITIONS

1.1.1 Whenever the following terms are used, their intent and meaning shall be interpreted as follows:

1.2 STATE: The State of Delaware.

1.3 AGENCY: Contracting State Agency as noted on cover sheet.

1.4 DESIGNATED OFFICIAL: The agent authorized to act for the Agency.

1.5 BIDDING DOCUMENTS: Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement for Bid, Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders (if any), General Conditions, Supplementary General Conditions, General Requirements, Special Provisions (if any), the Bid Form (including the Non-collusion Statement), and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, as well as the Drawings, Specifications (Project Manual) and all Addenda issued prior to execution of the Contract.

1.6 CONTRACT DOCUMENTS: The Contract Documents consist of the, Instructions to Bidders, Supplementary Instructions to Bidders (if any), General Conditions, Supplementary General Conditions, General Requirements, Special Provisions (if any), the form of agreement between the Owner and the Contractor, Drawings (if any), Specifications (Project Manual), and all addenda.

1.7 AGREEMENT: The form of the Agreement shall be AIA Document A101, Standard Form of Agreement between Owner and Contractor where the basis of payment is a STIPULATED SUM. In the case of conflict between the instructions contained therein and the General Requirements herein, these General Requirements shall prevail.

1.8 GENERAL REQUIREMENTS (or CONDITIONS): General Requirements (or conditions) are instructions pertaining to the Bidding Documents and to contracts in general. They contain, in summary, requirements of laws of the State; policies of the Agency and instructions to bidders.

1.9 SPECIAL PROVISIONS: Special Provisions are specific conditions or requirements peculiar to the bidding documents and to the contract under consideration and are supplemental to the General Requirements. Should the Special Provisions conflict with the General Requirements, the Special Provisions shall prevail.

1.10 ADDENDA: Written or graphic instruments issued by the Owner/Architect prior to the execution of the contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

- 1.11 BIDDER OR VENDOR: A person or entity who formally submits a Bid for the material or Work contemplated, acting directly or through a duly authorized representative who meets the requirements set forth in the Bidding Documents.
- 1.12 SUB-BIDDER: A person or entity who submits a Bid to a Bidder for materials or labor, or both for a portion of the Work.
- 1.13 BID: A complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- 1.14 BASE BID: The sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).
- 1.15 ALTERNATE BID (or ALTERNATE): An amount stated in the Bid, where applicable, to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents is accepted.
- 1.16 UNIT PRICE: An amount stated in the Bid, where applicable, as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.
- 1.17 SURETY: The corporate body which is bound with and for the Contract, or which is liable, and which engages to be responsible for the Contractor's payments of all debts pertaining to and for his acceptable performance of the Work for which he has contracted.
- 1.18 BIDDER'S DEPOSIT: The security designated in the Bid to be furnished by the Bidder as a guaranty of good faith to enter into a contract with the Agency if the Work to be performed or the material or equipment to be furnished is awarded to him.
- 1.19 CONTRACT: The written agreement covering the furnishing and delivery of material or work to be performed.
- 1.20 CONTRACTOR: Any individual, firm or corporation with whom a contract is made by the Agency.
- 1.21 SUBCONTRACTOR: An individual, partnership or corporation which has a direct contract with a contractor to furnish labor and materials at the job site, or to perform construction labor and furnish material in connection with such labor at the job site.
- 1.22 CONTRACT BOND: The approved form of security furnished by the contractor and his surety as a guaranty of good faith on the part of the contractor to execute the work in accordance with the terms of the contract.

ARTICLE 2: BIDDER'S REPRESENTATIONS

- 2.1 PRE-BID MEETING

- 2.1.1 A pre-bid meeting for this project will be held at the time and place designated. Attendance at this meeting is a pre-requisite for submitting a Bid, unless this requirement is specifically waived elsewhere in the Bid Documents.
- 2.2 By submitting a Bid, the Bidder represents that:
- 2.2.1 The Bidder has read and understands the Bidding Documents and that the Bid is made in accordance therewith.
- 2.2.2 The Bidder has visited the site, become familiar with existing conditions under which the Work is to be performed, and has correlated the Bidder's his personal observations with the requirements of the proposed Contract Documents.
- 2.2.3 The Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception.
- 2.3 **JOINT VENTURE REQUIREMENTS**
- 2.3.1 For Public Works Contracts, each Joint Venturer shall be qualified and capable to complete the Work with their own forces.
- 2.3.2 Included with the Bid submission, and as a requirement to bid, a copy of the executed Joint Venture Agreement shall be submitted and signed by all Joint Venturers involved.
- 2.3.3 All required Bid Bonds, Performance Bonds, Material and Labor Payment Bonds must be executed by both Joint Venturers and be placed in both of their names.
- 2.3.4 All required insurance certificates shall name both Joint Venturers.
- 2.3.5 Both Joint Venturers shall sign the Bid Form and shall submit a valid Delaware Business License Number with their Bid or shall state that the process of application for a Delaware Business License has been initiated.
- 2.3.6 Both Joint Venturers shall include their Federal E.I. Number with the Bid.
- 2.3.7 In the event of a mandatory Pre-bid Meeting, each Joint Venturer shall have a representative in attendance.
- 2.3.8 Due to exceptional circumstances and for good cause shown, one or more of these provisions may be waived at the discretion of the State.
- 2.4 **ASSIGNMENT OF ANTITRUST CLAIMS**
- 2.4.1 As consideration for the award and execution by the Owner of this contract, the Contractor hereby grants, conveys, sells, assigns and transfers to the State of Delaware all of its right, title and interests in and to all known or unknown causes of action it presently has or may now or hereafter acquire under the antitrust laws of the United States and the State of Delaware, relating to the particular goods or services purchased or acquired by the Owner pursuant to this contract.

ARTICLE 3: BIDDING DOCUMENTS

3.1 COPIES OF BID DOCUMENTS

- 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the Architectural/Engineering firm designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein.
- 3.1.2 Bidders shall use complete sets of Bidding Documents for preparation of Bids. The issuing Agency nor the Architect assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 3.1.3 Any errors, inconsistencies or omissions discovered shall be reported to the Architect immediately.
- 3.1.4 The Agency and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall report any errors, inconsistencies, or ambiguities discovered to the Architect.
- 3.2.2 Bidders or Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect at least seven days prior to the date for receipt of Bids. Interpretations, corrections and changes to the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes to the Bidding Documents made in any other manner shall not be binding.
- 3.2.3 The apparent silence of the specifications as to any detail, or the apparent omission from it of detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and only material and workmanship of the first quality are to be used. Proof of specification compliance will be the responsibility of the Bidder.
- 3.2.4 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all permits, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.
- 3.2.5 The Owner will bear the costs for all impact and user fees associated with the project.

3.3 SUBSTITUTIONS

- 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of quality, required function, dimension, and appearance to be met by any proposed substitution. The specification of a particular manufacturer or model number is not intended to be proprietary in any way. Substitutions of products for those named will

be considered, providing that the Vendor certifies that the function, quality, and performance characteristics of the material offered is equal or superior to that specified. It shall be the Bidder's responsibility to assure that the proposed substitution will not affect the intent of the design, and to make any installation modifications required to accommodate the substitution.

3.3.2 Requests for substitutions shall be made in writing to the Architect at least ten days prior to the date of the Bid Opening. Such requests shall include a complete description of the proposed substitution, drawings, performance and test data, explanation of required installation modifications due the substitution, and any other information necessary for an evaluation. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval shall be final. The Architect is to notify Owner prior to any approvals.

3.3.3 If the Architect approves a substitution prior to the receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding.

3.3.4 The Architect shall have no obligation to consider any substitutions after the Contract award.

3.4 ADDENDA

3.4.1 Addenda will be mailed or delivered to all who are known by the Architect to have received a complete set of the Bidding Documents.

3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

3.4.3 No Addenda will be issued later than 4 days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which extends the time or changes the location for the opening of bids.

3.4.4 Each bidder shall ascertain prior to submitting his Bid that they have received all Addenda issued, and shall acknowledge their receipt in their Bid in the appropriate space. Not acknowledging an issued Addenda could be grounds for determining a bid to be non-responsive.

ARTICLE 4: BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

4.1.1 Submit the bids on the Bid Forms included with the Bidding Documents.

4.1.2 Submit the original Bid Form for each bid. Bid Forms may be removed from the project manual for this purpose.

4.1.3 Execute all blanks on the Bid Form in a non-erasable medium (typewriter or manually in ink).

4.1.4 Where so indicated by the makeup on the Bid Form, express sums in both words and figures, in case of discrepancy between the two, the written amount shall govern.

- 4.1.5 Interlineations, alterations or erasures must be initialed by the signer of the Bid.
- 4.1.6 **BID ALL REQUESTED ALTERNATES AND UNIT PRICES, IF ANY.** If there is no change in the Base Bid for an Alternate, enter “No Change”. The Contractor is responsible for verifying that they have received all addenda issued during the bidding period. Work required by Addenda shall automatically become part of the Contract.
- 4.1.7 Make no additional stipulations on the Bid Form and do not qualify the Bid in any other manner.
- 4.1.8 Each copy of the Bid shall include the legal name of the Bidder and a statement whether the Bidder is a sole proprietor, a partnership, a corporation, or any legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current Power of Attorney attached, certifying agent's authority to bind the Bidder.
- 4.1.9 Bidder shall complete the Non-Collusion Statement form included with the Bid Forms and include it with their Bid.
- 4.1.10 In the construction of all Public Works projects for the State of Delaware or any agency thereof, preference in employment of laborers, workers or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State.
- 4.2 **BID SECURITY**
- 4.2.1 All bids shall be accompanied by a deposit of either a good and sufficient bond to the agency for the benefit of the agency, with corporate surety authorized to do business in this State, the form of the bond and the surety to be approved by the agency, or a security of the bidder assigned to the agency, for a sum equal to at least 10% of the bid plus all add alternates, or in lieu of the bid bond a security deposit in the form of a certified check, bank treasurer's check, cashier's check, money order, or other prior approved secured deposit assigned to the State. The bid bond need not be for a specific sum, but may be stated to be for a sum equal to 10% of the bid plus all add alternates to which it relates and not to exceed a certain stated sum, if said sum is equal to at least 10% of the bid. The Bid Bond form used shall be the standard OMB form (attached).
- 4.2.2 The Agency has the right to retain the bid security of Bidders to whom an award is being considered until either a formal contract has been executed and bonds have been furnished or the specified time has elapsed so the Bids may be withdrawn or all Bids have been rejected.
- 4.2.3 In the event of any successful Bidder refusing or neglecting to execute a formal contract and bond within 20 days of the awarding of the contract, the bid bond or security deposited by the successful bidder shall be forfeited.
- 4.3 **SUBCONTRACTOR LIST**

4.3.1 As required by Delaware Code, Title 29, section 6962(d)(10)b, each Bidder shall submit with their Bid a completed List of Sub-Contractors included with the Bid Form. NAME ONLY ONE SUBCONTRACTOR FOR EACH TRADE. A Bid will be considered non-responsive unless the completed list is included.

4.3.2 Provide the Name and Address for each listed subcontractor. Addresses by City, Town or Locality, plus State, will be acceptable.

4.3.3 It is the responsibility of the Contractor to ensure that their Subcontractors are in compliance with the provisions of this law. Also, if a Contractor elects to list themselves as a Subcontractor for any category, they must specifically name themselves on the Bid Form and be able to document their capability to act as Subcontractor in that category in accordance with this law.

4.4 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

4.4.1 During the performance of this contract, the contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex or national origin. The Contractor will take affirmative action to ensure the applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, 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 agency setting forth 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, creed, color, sex or national origin."

4.5 PREVAILING WAGE REQUIREMENT

4.5.1 Wage Provisions: In accordance with Delaware Code, Title 29, Section 6960, renovation projects whose total cost shall exceed \$15,000, and \$100,000 for new construction, the minimum wage rates for various classes of laborers and mechanics shall be as determined by the Department of Labor, Division of Industrial Affairs of the State of Delaware.

4.5.2 The prevailing wage shall be the wage paid to a majority of employees performing similar work as reported in the Department's annual prevailing wage survey or in the absence of a majority, the average paid to all employees reported.

4.5.3 The employer shall pay all mechanics and labors employed directly upon the site of work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics.

4.5.4 The scale of the wages to be paid shall be posted by the employer in a prominent and easily accessible place at the site of the work.

4.5.5 Every contract based upon these specifications shall contain a stipulation that sworn payroll information, as required by the Department of Labor, be furnished weekly. The Department of Labor shall keep and maintain the sworn payroll information for a period of 6 months from the last day of the work week covered by the payroll.

4.6 SUBMISSION OF BIDS

4.6.1 Enclose the Bid, the Bid Security, and any other documents required to be submitted with the Bid in a sealed opaque envelope. Address the envelope to the party receiving the Bids. Identify with the project name, project number, and the Bidder's name and address. If the Bid is sent by mail, enclose the sealed envelope in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof. The State is not responsible for the opening of bids prior to bid opening date and time that are not properly marked.

4.6.2 Deposit Bids at the designated location prior to the time and date for receipt of bids indicated in the Advertisement for Bids. Bids received after the time and date for receipt of bids will be marked "LATE BID" and returned.

4.6.3 Bidder assumes full responsibility for timely delivery at location designated for receipt of bids.

4.6.4 Oral, telephonic or telegraphic bids are invalid and will not receive consideration.

4.6.5 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids, provided that they are then fully in compliance with these Instructions to Bidders.

4.7 MODIFICATION OR WITHDRAW OF BIDS

4.7.1 Prior to the closing date for receipt of Bids, a Bidder may withdraw a Bid by personal request and by showing proper identification to the Architect. A request for withdraw by letter or fax, if the Architect is notified in writing prior to receipt of fax, is acceptable. A fax directing a modification in the bid price will render the Bid informal, causing it to be ineligible for consideration of award. Telephone directives for modification of the bid price shall not be permitted and will have no bearing on the submitted proposal in any manner.

4.7.2 Bidders submitting Bids that are late shall be notified as soon as practicable and the bid shall be returned.

4.7.3 A Bid may not be modified, withdrawn or canceled by the Bidder during a thirty (30) day period following the time and date designated for the receipt and opening of Bids, and Bidder so agrees in submitting their Bid. Bids shall be binding for 30 days after the date of the Bid opening.

ARTICLE 5: CONSIDERATION OF BIDS

5.1 OPENING/REJECTION OF BIDS

- 5.1.1 Unless otherwise stated, Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids will be made available to Bidders.
- 5.1.2 The Agency shall have the right to reject any and all Bids. A Bid not accompanied by a required Bid Security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.
- 5.1.3 If the Bids are rejected, it will be done within thirty (30) calendar day of the Bid opening.

5.2 COMPARISON OF BIDS

- 5.2.1 After the Bids have been opened and read, the bid prices will be compared and the result of such comparisons will be made available to the public. Comparisons of the Bids may be based on the Base Bid plus desired Alternates. The Agency shall have the right to accept Alternates in any order or combination.
- 5.2.2 The Agency reserves the right to waive technicalities, to reject any or all Bids, or any portion thereof, to advertise for new Bids, to proceed to do the Work otherwise, or to abandon the Work, if in the judgment of the Agency or its agent(s), it is in the best interest of the State.
- 5.2.3 An increase or decrease in the quantity for any item is not sufficient grounds for an increase or decrease in the Unit Price.
- 5.2.4 The prices quoted are to be those for which the material will be furnished F.O.B. Job Site and include all charges that may be imposed during the period of the Contract.
- 5.2.5 No qualifying letter or statements in or attached to the Bid, or separate discounts will be considered in determining the low Bid except as may be otherwise herein noted. Cash or separate discounts should be computed and incorporated into Unit Bid Price(s).

5.3 DISQUALIFICATION OF BIDDERS

- 5.3.1 An agency shall determine that each Bidder on any Public Works Contract is responsible before awarding the Contract. Factors to be considered in determining the responsibility of a Bidder include:
- A. The Bidder's financial, physical, personnel or other resources including Subcontracts;
 - B. The Bidder's record of performance on past public or private construction projects, including, but not limited to, defaults and/or final adjudication or admission of violations of the Prevailing Wage Laws in Delaware or any other state;
 - C. The Bidder's written safety plan;
 - D. Whether the Bidder is qualified legally to contract with the State;

- E. Whether the Bidder supplied all necessary information concerning its responsibility; and,
 - F. Any other specific criteria for a particular procurement, which an agency may establish; provided however, that, the criteria be set forth in the Invitation to Bid and is otherwise in conformity with State and/or Federal law.
- 5.3.2 If an agency determines that a Bidder is nonresponsive and/or nonresponsible, the determination shall be in writing and set forth the basis for the determination. A copy of the determination shall be sent to the affected Bidder within five (5) working days of said determination.
- 5.3.3 In addition, any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of their Bid or Bids.
- 5.3.3.1 More than one Bid for the same Contract from an individual ~~firm~~ or corporation under the same or different names.
 - 5.3.3.2 Evidence of collusion among Bidders.
 - 5.3.3.3 Unsatisfactory performance record as evidenced by past experience.
 - 5.3.3.4 If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.
 - 5.3.3.5 If there are any unauthorized additions, interlineation, conditional or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite or ambiguous as to its meaning.
 - 5.3.3.6 If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.
 - 5.3.3.7 If any exceptions or qualifications of the Bid are noted on the Bid Form.
- 5.4 ACCEPTANCE OF BID AND AWARD OF CONTRACT
- 5.4.1 A formal Contract shall be executed with the successful Bidder within twenty (20) calendar days after the award of the Contract.
 - 5.4.2 Per Section 6962(d)(13) a., Title 29, Delaware Code, "The contracting agency shall award any public works contract within thirty (30) days of the bid opening to the lowest responsive and responsible Bidder, unless the Agency elects to award on the basis of best value, in which case the election to award on the basis of best value shall be stated in the Invitation To Bid."
 - 5.4.3 Each Bid on any Public Works Contract must be deemed responsive by the Agency to be considered for award. A responsive Bid shall conform in all material respects to the requirements and criteria set forth in the Contract Documents and specifications.
 - 5.4.4 The Agency shall have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid, plus accepted Alternates.

- 5.4.5 The successful Bidder shall execute a formal contract, submit the required Insurance Certificate, and furnish good and sufficient bonds, unless specifically waived in the General Requirements, in accordance with the General Requirement, within twenty (20) days of official notice of contract award. Bonds shall be for the benefit of the Agency with surety in the amount of 100% of the total contract award. Said Bonds shall be conditioned upon the faithful performance of the contract. Bonds shall remain in affect for period of one year after the date of substantial completion.
- 5.4.6 If the successful Bidder fails to execute the required Contract and Bond, as aforesaid, within twenty (20) calendar days after the date of official Notice of the Award of the Contract, their Bid guaranty shall immediately be taken and become the property of the State for the benefit of the Agency as liquidated damages, and not as a forfeiture or as a penalty. Award will then be made to the next lowest qualified Bidder of the Work or readvertised, as the Agency may decide.
- 5.4.7 Each bidder shall supply with its bid its taxpayer identification number (i.e., federal employer identification number or social security number) or a Delaware business license number, and should the vendor be awarded a contract, such vendor shall provide to the agency the taxpayer identification or Delaware business license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. Prior to execution of the resulting contract, the successful Bidder shall be required to produce proof of its Delaware business license if not provided in its bid.
- 5.4.8 The Bid Security shall be returned to the successful Bidder upon the execution of the formal contract. The Bid Securities of unsuccessful bidders shall be returned within thirty (30) calendar days after the opening of the Bids.

ARTICLE 6: POST-BID INFORMATION

- 6.1 CONTRACTOR'S QUALIFICATION STATEMENT
- 6.1.1 Bidders to whom award of a Contract is under consideration shall, if requested by the Agency submit a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a statement has been previously required and submitted.
- 6.2 BUSINESS DESIGNATION FORM
- 6.2.1 Successful bidder shall be required to accurately complete an Office of Management and Budget Business Designation Form for Subcontractors.

ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

- 7.1 BOND REQUIREMENTS
- 7.1.1 The cost of furnishing the required Bonds, that are stipulated in the Bidding Documents, shall be included in the Bid.
- 7.1.2 If the Bidder is required by the Agency to secure a bond from other than the Bidder's usual sources, changes in cost will be adjusted as provide in the Contract Documents.

7.1.3 The Performance and Payment Bond forms used shall be the standard OMB forms (attached).

7.2 TIME OF DELIVERY AND FORM OF BONDS

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

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

ARTICLE 8: FORM OF AGREEMENT BETWEEN AGENCY AND CONTRACTOR

8.1 Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum.

END OF INSTRUCTIONS TO BIDDERS

CANNOT BE USED FOR BIDDING

DELAWARE STATE POLICE TROOPS 1 & 6 - RENOVATIONS
TROOP 1, 603 PHILADELPHIA PIKE, WILMINGTON, DE 19809
TROOP 6, 3301 KIRKWOOD HIGHWAY, WILMINGTON, DE 19808
MC4506000035

BID FORM

For Bids Due: _____ (DATE)

To: STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF FACILITIES MANAGEMENT
THOMAS COLLINS BUILDING
540 S. DUPONT HIGHWAY
SUITE 1, THIRD FLOOR
DOVER, DELAWARE 19901

Name of Bidder: _____

Delaware Business License No.: _____ Taxpayer ID No.: _____

(Other License Nos.): _____

Phone No.: () _____ - _____ Fax No.: () _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

Base Bid N/A

ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed out part that does not apply.

Troop 1 - ALTERNATE No. 1: REPLACE GARAGE WINDOWS – Provide labor and materials to remove existing aluminum frames, sash and glazing. Install new thermally improved aluminum frames and sash with insulating glazing units as indicated on the drawings and specifications.

Add/Deduct: _____
(\$)

Troop 1 - ALTERNATE No. 2: DEMOLISH EXISITNG PUBLIC RESTROOMS AND STAIRS – Provide labor and materials to demolish and remove the existing Public Rest Rooms and exterior masonry stairs. Infill existing door openings. Renovate demolished space into a new Break Room as indicated on the drawings and specifications. Demolish existing closet and surrounding space in Lieutenant's Office and Lobby. Build new ADA compliant Public Restroom as indicated on drawings and specifications.

Add/Deduct: _____
(\$)

Troop 1 - ALTERNATE No. 3: NEW OIL-SAND INCEPTOR – Provide labor and materials needed to install a new underground oil-sand inceptor as indicated on drawings and specifications.

Add/Deduct: _____
(\$)

DELAWARE STATE POLICE TROOPS 1 & 6 - RENOVATIONS
TROOP 1, 603 PHILADELPHIA PIKE, WILMINGTON, DE 19809
TROOP 6, 3301 KIRKWOOD HIGHWAY, WILMINGTON, DE 19808
MC4506000035

BID FORM

Troop 6 - ALTERNATE No. 4: REPOINT, REPAIR, RESET EXISTING BRICK – Provide labor and materials required to repoint, repair or reset existing brick veneer as indicated on the drawings and specifications.

Add/Deduct: _____
(\$ _____)

Troop 6 - ALTERNATE No. 5: REPAIR ROOFING SEAMS AND PATCHES – Provide labor and materials as required to seal existing seams and patches, secure edges of existing EPDM roof as indicated on drawings and specifications.

Add/Deduct: _____
(\$ _____)

Troop 6 - ALTERNATE No. 6: RESEAL FRONT DECK – Provide labor and materials as required to prep and seal existing front deck as indicated on drawings and specifications.

Add/Deduct: _____
(\$ _____)

Troop 6 - ALTERNATE No.7: REPLACE MAIN BUILDING WINDOWS - Provide labor and materials to remove existing aluminum frames, sash and glazing. Install new thermally improved aluminum frames and sash with insulating glazing units as indicated on the drawings and specifications

Add/Deduct: _____
(\$ _____)

Troop 6 - ALTERNATE No. 8: REPLACE GARAGE WINDOWS - Provide labor and materials to remove existing aluminum frames, sash and glazing. Install new thermally improved aluminum frames and sash with insulating glazing units as indicated on the drawings and specifications.

Add/Deduct: _____
(\$ _____)

Troop 6 - ALTERNATE No. 9: CLEAN & PAINT STEEL SHELF ANGLES – Provide labor and materials to clean all existing steel shelf angles to bare metal, treat with rust inhibitor, prime and paint as indicated on drawings and specifications.

Add/Deduct: _____
(\$ _____)

UNIT PRICES

Unit prices conform to applicable project specification section. Refer to the specifications for a complete description of the following Unit Prices:

	<u>ADD</u>	<u>DEDUCT</u>
UNIT PRICE No. 1: Repointing – rake out, clean and repoint brick joints for a 10 square foot area.	\$ _____	\$ _____

DELAWARE STATE POLICE TROOPS 1 & 6 - RENOVATIONS
TROOP 1, 603 PHILADELPHIA PIKE, WILMINGTON, DE 19809
TROOP 6, 3301 KIRKWOOD HIGHWAY, WILMINGTON, DE 19808
MC4506000035

BID FORM

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within _____ calendar days of the Notice to Proceed.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within (twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am / We are an Individual / a Partnership / a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

(State of Corporation)

Business Address: _____

Witness: _____ **By:** _____
(SEAL) (Authorized Signature)

(Title)
Date: _____

ATTACHMENTS

- Sub-Contractor List
- Non-Collusion Statement
- Bid Security
- (Others as Required by Project Manuals)

DELAWARE STATE POLICE TROOPS 1 & 6 - RENOVATIONS
TROOP 1, 603 PHILADELPHIA PIKE, WILMINGTON, DE 19809
TROOP 6, 3301 KIRKWOOD HIGHWAY, WILMINGTON, DE 19808
MC4506000035

BID FORM

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 6962 (d)(10)b Delaware Code, the following sub-contractor listing must accompany the bid submittal. The name and address of the sub-contractor **must be listed for each category** where the bidder intends to use a sub-contractor to perform that category of work. In order to provide full disclosure and acceptance of the bid by the *Owner*, **it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work.**

<u>Subcontractor Category</u>	<u>Subcontractor</u>	<u>Address (City & State)</u>	<u>Subcontractors tax payer ID # or Delaware Business license #</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____

CANNOT BE USED FOR BIDDING

BID FORM

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date (*to the Office of Management and Budget, Division of Facilities Management*).

All the terms and conditions of (*Project or Contract Number*) have been thoroughly examined and are understood.

NAME OF BIDDER: _____

**AUTHORIZED REPRESENTATIVE
(TYPED):** _____

**AUTHORIZED REPRESENTATIVE
(SIGNATURE):** _____

TITLE: _____

ADDRESS OF BIDDER: _____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That: _____
_____ of _____ in the County of _____
_____ and State of _____ as **Principal**, and _____
_____ of _____ in the County of _____
and State of _____ as **Surety**, legally authorized to do business in the State of Delaware
("State"), are held and firmly unto the **State** in the sum of _____
_____ Dollars (\$ _____), or _____ percent not to exceed _____
_____ Dollars (\$ _____)
of amount of bid on Contract No. _____, to be paid to the **State** for the use and
benefit of _____ (*insert State agency name*) for which payment
well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators, and
successors, jointly and severally for and in the whole firmly by these presents.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH That if the above bonded **Principal**
who has submitted to the _____ (*insert State agency name*) a
certain proposal to enter into this contract for the furnishing of certain material and/or services within the
State, shall be awarded this Contract, and if said **Principal** shall well and truly enter into and execute this
Contract as may be required by the terms of this Contract and approved by the _____
_____ (*insert State agency name*) this Contract to be entered into within twenty days after
the date of official notice of the award thereof in accordance with the terms of said proposal, then this
obligation shall be void or else to be and remain in full force and virtue.

Sealed with _____ seal and dated this _____ day of _____ in the year of our Lord two
thousand and _____ (20____).

SEALED, AND DELIVERED IN THE
Presence of

CANNOT BE USED FOR BIDDING

Name of Bidder (Organization)

Corporate
Seal

By:

Authorized Signature

Attest _____

Title

Name of Surety

Witness: _____

By:

Title

**STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR A101-
2007**

The contract to be utilized on this project shall be the “Standard Form of Agreement Between Owner and Contractor” AIA Document A101-2007.

CANNOT BE USED FOR BIDDING.

DRAFT AIA® Document A101™ - 2007

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

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

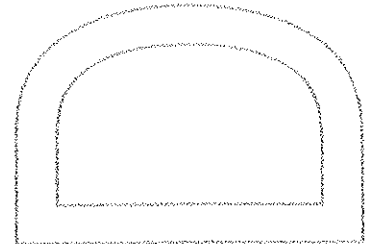
The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

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

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

AIA Document A201™-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.



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TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
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- 4 CONTRACT SUM
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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

Portion of Work

Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« »

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » (\$ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit (\$0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported

by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of percent (%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™-2007, General Conditions of the Contract for Construction;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of percent (%);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201-2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« »

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201-2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201-2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201-2007, the method of binding dispute resolution shall be as follows:

(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

Arbitration pursuant to Section 15.4 of AIA Document A201-2007

Litigation in a court of competent jurisdiction

Other *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201-2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201-2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

« » % « »

§ 8.3 The Owner's representative:

(Name, address and other information)

« »
« »
« »
« »
« »
« »
« »

§ 8.4 The Contractor's representative:

(Name, address and other information)

« »
« »
« »
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« »

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201-2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« »

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

- .1 AIA Document E201™-2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:



- .2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201-2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)



ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201-2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201-2007.)

Type of insurance or bond	Limit of liability or bond amount (\$0.00)

This Agreement entered into as of the day and year first written above.

 OWNER (Signature)

« »

(Printed name and title)

 CONTRACTOR (Signature)

« »

(Printed name and title)

CANNOT BE USED FOR BIDDING

SUPPLEMENT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR A101-2007

The following supplements modify the "Standard Form of Agreement Between Owner and Contractor," AIA Document A101-2007. Where a portion of the Standard Form of Agreement is modified or deleted by the following, the unaltered portions of the Standard Form of Agreement shall remain in effect.

ARTICLE 5: PAYMENTS

5.1 PROGRESS PAYMENTS

5.1.3 Delete paragraph 5.1.3 in its entirety and replace with the following:

"Provided that a valid Application for Payment is received by the Architect that meets all requirements of the Contract, payment shall be made by the Owner not later than 30 days after the Owner receives the valid Application for Payment."

ARTICLE 6: DISPUTE RESOLUTION

6.2 BINDING DISPUTE RESOLUTION

Check Other – and add the following sentence:

"Any remedies available in law or in equity."

ARTICLE 8: MISCELLANEOUS PROVISIONS

8.2 Insert the following:

"Payments are due 30 days after receipt of a valid Application for Payment. After that 30 day period, interest may be charged at the rate of 1% per month not to exceed 12% per annum."

8.5 Delete paragraph 8.5 in its entirety and replace with the following:

"The Contractor's representative shall not be changed without ten days written notice to the Owner."

END OF SUPPLEMENT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

PERFORMANCE BOND

Bond Number: _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____, as principal (“**Principal**”), and _____, a _____ corporation, legally authorized to do business in the State of Delaware, as surety (“**Surety**”), are held and firmly bound unto the _____ (“**Owner**”) (*insert State agency name*), in the amount of _____ (\$_____), to be paid to **Owner**, for which payment well and truly to be made, we do bind ourselves, our and each and every of our heirs, executors, administrations, successors and assigns, jointly and severally, for and in the whole, firmly by these presents.

Sealed with our seals and dated this _____ day of _____, 20__.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. _____ dated the _____ day of _____, 20__ (the “Contract”), which Contract is incorporated herein by reference, shall well and truly provide and furnish all materials, appliances and tools and perform all the work required under and pursuant to the terms and conditions of the Contract and the Contract Documents (as defined in the Contract) or any changes or modifications thereto made as therein provided, shall make good and reimburse **Owner** sufficient funds to pay the costs of completing the Contract that **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void, otherwise to be and remain in full force and effect.

Surety, for value received, hereby stipulates and agrees, if requested to do so by **Owner**, to fully perform and complete the work to be performed under the Contract pursuant to the terms, conditions and covenants thereof, if for any cause **Principal** fails or neglects to so fully perform and complete such work.

Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of **Surety** and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any work to be performed or any monies due or to become due thereunder; and **Surety** hereby waives notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other

transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

Surety hereby stipulates and agrees that no modifications, omissions or additions in or to the terms of the Contract shall in any way whatsoever affect the obligation of **Surety** and its bond.

Any proceeding, legal or equitable, under this Bond may be brought in any court of competent jurisdiction in the State of Delaware. Notices to **Surety** or Contractor may be mailed or delivered to them at their respective addresses shown below.

IN WITNESS WHEREOF, **Principal** and **Surety** have hereunto set their hand and seals, and such of them as are corporations have caused their corporate seal to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first above written.

PRINCIPAL

Name: _____

Witness or Attest: Address: _____

Name:

(Corporate Seal)

By: _____ (SEAL)

Name:

Title:

SURETY

Name: _____

Witness or Attest: Address: _____

Name:

(Corporate Seal)

By: _____ (SEAL)

Name:

Title:

STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

PAYMENT BOND

Bond Number: _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____, as principal (“**Principal**”), and _____, a _____ corporation, legally authorized to do business in the State of Delaware, as surety (“**Surety**”), are held and firmly bound unto the _____ (“**Owner**”) (*insert State agency name*), in the amount of _____ (\$_____), to be paid to **Owner**, for which payment well and truly to be made, we do bind ourselves, our and each and every of our heirs, executors, administrations, successors and assigns, jointly and severally for and in the whole firmly by these presents.

Sealed with our seals and dated this _____ day of _____, 20__.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. _____ dated the _____ day of _____, 20__ (the “Contract”), which Contract is incorporated herein by reference, shall well and truly pay all and every person furnishing materials or performing labor or service in and about the performance of the work under the Contract, all and every sums of money due him, her, them or any of them, for all such materials, labor and service for which **Principal** is liable, shall make good and reimburse **Owner** sufficient funds to pay such costs in the completion of the Contract as **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void otherwise to be and remain in full force and effect.

Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of **Surety** and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any work to be performed or any monies due or to become due thereunder; and **Surety** hereby waives notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

Surety hereby stipulates and agrees that no modifications, omission or additions in or to the terms of the Contract shall in any way whatsoever affect the obligation of **Surety** and its bond.

Any proceeding, legal or equitable, under this Bond may be brought in any court of competent jurisdiction in the State of Delaware. Notices to **Surety** or Contractor may be mailed or delivered to them at their respective addresses shown below.

IN WITNESS WHEREOF, **Principal** and **Surety** have hereunto set their hand and seals, and such of them as are corporations have caused their corporate seal to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first above written.

PRINCIPAL

Name: _____

Witness or Attest: Address: _____

Name:

(Corporate Seal)

By: _____ (SEAL)
Name:
Title:

SURETY

Name: _____

Witness or Attest: Address: _____

Name:

(Corporate Seal)

By: _____ (SEAL)
Name:
Title:

CANNOT BE USED FOR BIDDING.

AIA® Document G702™ - 1992

Application and Certificate for Payment

TO OWNER: PROJECT: DVMC - Bear APPLICATION NO: 001 Distribution to: OWNER: ARCHITECT: CONTRACTOR: FIELD:

PERIOD TO: General Construction CONTRACT FOR: CONTRACT DATE: PROJECT NOS:

FROM CONTRACTOR: VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract Continuation Sheet, AIA Document G703, is attached.

- 1. ORIGINAL CONTRACT SUM..... \$0.00
- 2. NET CHANGE BY CHANGE ORDERS..... \$0.00
- 3. CONTRACT SUM TO DATE (Line 1 ± 2)..... \$0.00
- 4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)..... \$0.00

- 5. RETAINAGE:
 - a. 0 % of Completed Work (Column D + E on G703) = \$0.00
 - b. 0 % of Stored Material (Column F on G703) = \$0.00

- 6. TOTAL EARNED LESS RETAINAGE..... \$0.00 (Line 4 Less Line 5 Total)
- 7. LESS PREVIOUS CERTIFICATES FOR PAYMENT..... \$0.00 (Line 6 from prior Certificate)
- 8. CURRENT PAYMENT DUE..... \$0.00
- 9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6) \$0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$0.00	\$0.00
Total approved this Month	\$0.00	\$0.00
TOTALS	\$0.00	\$0.00
NET CHANGES by Change Order		\$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR: _____ Date: _____

By: _____ State of: _____ County of: _____ Subscribed and sworn to before me this _____ day of _____ Notary Public: _____ My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED..... \$0.00 (Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT: _____ Date: _____

By: _____ This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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DRAFT AIA® Document A201™ - 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

«State of DE Front :End»

« »

THE OWNER:

(Name, legal status and address)

« »« »

« »

THE ARCHITECT:

(Name, legal status and address)

« »« »

« »

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- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
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- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

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

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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

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

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

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

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

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

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

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

§ 3.4 LABOR AND MATERIALS

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

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

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

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

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

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

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

§ 3.9 SUPERINTENDENT

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

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

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

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

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled

to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

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

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

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

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

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

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

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

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

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

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

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

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and no inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

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

furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

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

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

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the

Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

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

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

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

§ 9.6 PROGRESS PAYMENTS

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

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

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

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

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

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

§ 9.7 FAILURE OF PAYMENT

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

§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

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

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

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

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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

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

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

§ 10.3 HAZARDOUS MATERIALS

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

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

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

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

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

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

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

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's

risk “all-risk” or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an “all-risk” or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect’s and Contractor’s services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

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

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner’s option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner’s property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner’s property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

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

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

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

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

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

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

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

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

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

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

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

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

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

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

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

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

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

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

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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

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

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

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

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

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

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

§ 15.1.2 NOTICE OF CLAIMS

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

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

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

§ 15.2 INITIAL DECISION

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

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

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

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

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

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

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

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

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

§ 15.3 MEDIATION

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

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

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

§ 15.4 ARBITRATION

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

party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

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

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

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

CANNOT BE USED FOR BIDDING

SUPPLEMENTARY GENERAL CONDITIONS A201-2007

The following supplements modify the “General Conditions of the Contract for Construction,” AIA Document A201-2007. Where a portion of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

TABLE OF ARTICLES

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
4. ADMINISTRATION OF THE CONTRACT
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6. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
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14. TERMINATION OR SUSPENSION OF THE CONTRACT

ARTICLE 1: GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

Delete the last sentence in its entirety and replace with the following:

“The Contract Documents also include Advertisement for Bid, Instructions to Bidder, sample forms, the Bid Form, the Contractor’s completed Bid and the Award Letter.”

Add the following Paragraph:

1.1.2 In the event of conflict or discrepancies among the Contract Documents, the Documents prepared by the State of Delaware, Division of Facilities Management shall take precedence over all other documents.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following Paragraphs:

1.2.4 In the case of an inconsistency between the Drawings and the Specifications, or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect’s interpretation.

1.2.5 The word “PROVIDE” as used in the Contract Documents shall mean “FURNISH AND INSTALL” and shall include, without limitation, all labor, materials, equipment, transportation, services and other items required to complete the Work.

1.2.6 The word “PRODUCT” as used in the Contract Documents means all materials, systems and equipment.

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

Delete Paragraph 1.5.1 in its entirety and replace with the following:

“All pre-design studies, drawings, specifications and other documents, including those in electronic form, prepared by the Architect under this Agreement are, and shall remain, the property of the Owner whether the Project for which they are made is executed or not. Such documents may be used by the Owner to construct one or more like Projects without the approval of, or additional compensation to, the Architect. The Contractor, Subcontractors, Sub-subcontractors and Material or Equipment Suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect’s consultants appropriate to and for use in the execution of their Work under the Contract Documents. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or Material and Equipment Supplier on other Projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and Architect’s consultants.

The Architect shall not be liable for injury or damage resulting from the re-use of drawings and specifications if the Architect is not involved in the re-use Project. Prior to re-use of construction documents for a Project in which the Architect is not also involved, the Owner will remove from such documents all identification of the original Architect, including name, address and professional seal or stamp.”

Delete Paragraph 1.5.2 in its entirety.

ARTICLE 2: OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

To Subparagraph 2.2.3 – Add the following sentence:

“The Contractor, at their expense shall bear the costs to accurately identify the location of all underground utilities in the area of their excavation and shall bear all cost for any repairs required, out of failure to accurately identify said utilities.”

Delete Subparagraph 2.2.5 in its entirety and substitute the following:

2.2.5 The Contractor shall be furnished free of charge up to five (5) sets of the Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3: CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Amend Paragraph 3.2.2 to state that any errors, inconsistencies or omissions discovered shall be reported to the Architect and Owner immediately.

Delete the third sentence in Paragraph 3.2.3.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following Paragraphs:

3.3.2.1 The Contractor shall immediately remove from the Work, whenever requested to do so by the Owner, any person who is considered by the Owner or Architect to be incompetent or disposed to be so disorderly, or who for any reason is not satisfactory to the Owner, and that person shall not again be employed on the Work without the consent of the Owner or the Architect.

3.3.4 The Contractor must provide suitable storage facilities at the Site for the proper protection and safe storage of their materials. Consult the Owner and the Architect before storing any materials.

3.3.5 When any room is used as a shop, storeroom, office, etc., by the Contractor or Subcontractor(s) during the construction of the Work, the Contractor making use of these areas will be held responsible for any repairs, patching or cleaning arising from such use.

3.4 LABOR AND MATERIALS

Add the Following Paragraphs:

3.4.4 Before starting the Work, each Contractor shall carefully examine all preparatory Work that has been executed to receive their Work. Check carefully, by whatever means are required, to insure that its Work and adjacent, related Work, will finish to proper contours, planes and levels. Promptly notify the General Contractor/Construction Manager of any defects or imperfections in preparatory Work which will in any way affect satisfactory completion of its Work. Absence of such notification will be construed as an acceptance of preparatory Work and later claims of defects will not be recognized.

3.4.5 Under no circumstances shall the Contractor's Work proceed prior to preparatory Work having been completely cured, dried and/or otherwise made satisfactory to receive this Work. Responsibility for timely installation of all materials rests solely with the Contractor responsible for that Work, who shall maintain coordination at all times.

3.5 WARRANTY

Add the following Paragraphs:

3.5.1 The Contractor will guarantee all materials and workmanship against original defects, except injury from proper and usual wear when used for the purpose intended, for two years after Acceptance by the Owner, and will maintain all items in perfect condition during the period of guarantee.

3.5.2 Defects appearing during the period of guarantee will be made good by the Contractor at his expense upon demand of the Owner, it being required that all work will be in perfect condition when the period of guarantee will have elapsed.

3.5.3 In addition to the General Guarantee there are other guarantees required for certain items for different periods of time than the two years as above, and are particularly so stated in that part of the specifications referring to same. The said guarantees will commence at the same time as the General Guarantee.

3.5.4 If the Contractor fails to remedy any failure, defect or damage within a reasonable time after receipt of notice, the Owner will have the right to replace, repair, or otherwise remedy the failure, defect or damage at the Contractor's expense.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following Paragraphs:

- 3.11.1 During the course of the Work, the Contractor shall maintain a record set of drawings on which the Contractor shall mark the actual physical location of all piping, valves, equipment, conduit, outlets, access panels, controls, actuators, including all appurtenances that will be concealed once construction is complete, etc., including all invert elevations.
- 3.11.2 At the completion of the project, the Contractor shall obtain a set of reproducible drawings from the Architect, and neatly transfer all information outlined in 3.11.1 to provide a complete record of the as-built conditions.
- 3.11.3 The Contractor shall provide two (2) prints of the as-built conditions, along with the reproducible drawings themselves, to the Owner and one (1) set to the Architect. In addition, attach one complete set to each of the Operating and Maintenance Instructions/Manuals.

3.17 In the first sentence of the paragraph, insert “indemnify” between “shall” and “hold”.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.2 ADMINISTRATION OF THE CONTRACT

Delete the first sentence of Paragraph 4.2.7 and replace with the following:

The Architect will review and approve or take other appropriate action upon the Contractor’s submittals such as Shop Drawings, Product Data and Samples for the purpose of checking for conformance with the Contract Documents.

Delete the second sentence of Paragraph 4.2.7 and replace with the following:

The Architect’s action will be taken with such reasonable promptness as to cause no delay in the Work in the activities of the Owner, Contractor or separate Contractors, while allowing sufficient time in the Owner’s professional judgment to permit adequate review.

Add the following Paragraph:

- 4.2.10.1 There will be no full-time project representative provided by the Owner or Architect on this project.

Add to Paragraph 4.2.13 “and in compliance with all local requirements.” to the end of the sentence

ARTICLE 5: SUBCONTRACTORS

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

Delete Paragraph 5.2.3 in its entirety and replace with the following:

5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection, subject to the statutory requirements of 29 Delaware Code § 6962(d)(10)b.3 and 4.

ARTICLE 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

Delete Paragraph 6.1.4 in its entirety.

6.2 MUTUAL RESPONSIBILITY

6.2.3 In the second sentence, strike the word "shall" and insert the word "may".

ARTICLE 7: CHANGES IN THE WORK

(SEE ARTICLE 7: CHANGES IN WORK IN THE GENERAL REQUIREMENTS)

ARTICLE 8: TIME

8.2 PROGRESS AND COMPLETION

Add the following Paragraphs:

8.2.1.1 Refer to Specification Section SUMMARY OF WORK for Contract time requirements.

8.2.4 If the Work falls behind the Progress Schedule as submitted by the Contractor, the Contractor shall employ additional labor and/or equipment necessary to bring the Work into compliance with the Progress Schedule at no additional cost to the Owner.

8.3 DELAYS AND EXTENSION OF TIME

8.3.1 Strike "arbitration" and insert "remedies at law or in equity".

Add the following Paragraph:

8.3.2.1 The Contractor shall update the status of the suspension, delay, or interruption of the Work with each Application for Payment. (The Contractor shall report the termination of such cause immediately upon the termination thereof.) Failure to comply with this procedure shall constitute a waiver for any claim for adjustment of time or price based upon said cause.

Delete Paragraph 8.3.3 in its entirety and replace with the following:

8.3.3 Except in the case of a suspension of the Work directed by the Owner, an extension of time under the provisions of Paragraph 8.3.1 shall be the Contractor's sole remedy in the progress of the Work and there shall be no payment or compensation to the Contractor for any expense or damage resulting from the delay.

Add the following Paragraph:

8.3.4 By permitting the Contractor to work after the expired time for completion of the project, the Owner does not waive their rights under the Contract.

ARTICLE 9: PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

Add the following Paragraphs:

9.2.1 The Schedule of Values shall be submitted using AIA Document G702, Continuation Sheet to G703.

9.2.2 The Schedule of Values is to include a line item for Project Closeout Document Submittal. The value of this item is to be no less than 1% of the initial contract amount.

9.3 APPLICATIONS FOR PAYMENT

Add the following Paragraph:

9.3.1.3 Application for Payment shall be submitted on AIA Document G702 "Application and Certificate for Payment", supported by AIA Document G703 "Continuation Sheet". Said Applications shall be fully executed and notarized.

Add the following Paragraphs:

9.3.4 Until Closeout Documents have been received and outstanding items completed the Owner will pay 95% (ninety-five percent) of the amount due the Contractor on account of progress payments.

9.3.5 The Contractor shall provide a current and updated Progress Schedule to the Architect with each Application for Payment. Failure to provide Schedule will be just cause for rejection of Application for Payment.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following to 9.5.1:

- .8 failure to provide a current Progress Schedule;
- .9 a lien or attachment is filed;

.10 failure to comply with mandatory requirements for maintaining Record Documents.

9.6 PROGRESS PAYMENTS

Delete Paragraph 9.6.1 in its entirety and replace with the following:

9.6.1 After the Architect has approved and issued a Certificate for Payment, payment shall be made by the Owner within 30 days after Owner's receipt of the Certificate for Payment.

9.7 FAILURE OF PAYMENT

In first sentence, strike "seven" and insert "thirty (30)". Also strike "binding dispute resolution" and insert "remedies at law or in equity".

9.8 SUBSTANTIAL COMPLETION

To Subparagraph 9.8.3- Add the following sentence:

"If the Architect is required to make more than 2 inspections of the same portion of work, the Contractor shall responsible for all costs associated with subsequent inspections including but not limited to any Architect's fees."

9.8.5 In the second sentence, strike "shall" and insert "may".

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

Add the following Paragraphs:

10.1.1.1.1 Each Contractor shall develop a safety program in accordance with the Occupational Safety and Health Act of 1970. A copy of said plan shall be furnished to the Owner and Architect prior to the commencement of that Contractor's Work.

10.1.2 Each Contractor shall appoint a Safety Representative. Safety Representatives shall be someone who is on site on a full time basis. If deemed necessary by the Owner or Architect, Contractor Safety meetings will be scheduled. The attendance of all Safety Representatives will be required. Minutes will be recorded of said meetings by the Contractor and will be distributed to all parties as well as posted in all job offices/trailers etc.

10.2 SAFETY OF PERSONS AND PROPERTY

Add the following Paragraph:

10.2.4.1 As required in the Hazardous Chemical Act of June 1984, all vendors supplying any material that may be defined as hazardous must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a caution warning on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in foreseeable emergency situations. Material Safety Data Sheets shall be provided directly to the Owner, along with the shipping slips that include those products.

10.3 HAZARDOUS MATERIALS

Delete Paragraph 10.3.3 in its entirety.

10.5 Delete Paragraphs 10.3.6 in its entirety.

ARTICLE 11: INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.4 Strike "the Owner" immediately following "(1)" and strike "and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations."

11.2 OWNER'S LIABILITY INSURANCE

Delete Paragraph 11.2 in its entirety.

11.3 PROPERTY INSURANCE

Delete Paragraph 11.3 in its entirety and replace with the following:

11.3 The State will not provide Builder's All Risk Insurance for the Project. The Contractor and all Subcontractors shall provide property coverage for their tools and equipment, as necessary. Any mandatory deductible required by the Contractor's Insurance shall be the responsibility of the Contractor.

11.4 PERFORMANCE BOND AND PAYMENT BOND

Add the following sentence: "The bonds will conform to those forms approved by the Office of Management and Budget."

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

Add the following Paragraph:

12.2.2.1.1 At any time during the progress of the Work, or in any case where the nature of the defects will be such that it is not expedient to have corrected, the Owner, at its option, will have the right to deduct such sum, or sums, of money from the amount of the Contract as it considers justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

12.2.2.1 Strike "one" and insert "two".

12.2.2.2 Strike "one" and insert "two".

12.2.2.3 Strike "one" and insert "two".

12.2.5 In second sentence, strike "one" and insert "two".

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Strike "except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4."

13.6 INTEREST

Strike "the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located." Insert "30 days of presentment of the authorized Certificate of Payment at the annual rate of 12% or 1% per month.

13.7 TIME LIMITS ON CLAIMS

Strike the last sentence.

Add the following Paragraph:

13.8 CONFLICTS WITH FEDERAL STATUTES OR REGULATIONS

13.8.1 If any provision, specifications or requirement of the Contract Documents conflict or is inconsistent with any statute, law or regulation of the government of the United State of America, the Contractor shall notify the Architect and Owner immediately upon discovery.

ARTICLE 14: TERMINATION OR SUSPENSION OF THE CONTRACT

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

Delete Paragraph 14.4.3 in its entirety and replace with the following:

14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and cost incurred by reason of such termination along with reasonable overhead.

ARTICLE 15: CLAIMS AND DISPUTES

15.1.2 Throughout the Paragraph strike "21" and insert "45".

15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

Delete Paragraph 15.1.6 in its entirety.

15.2 INITIAL DECISION

Delete Paragraph 15.2.5 in its entirety and replace with the following:

15.2.5 The Architect will approve or reject Claims by written decision, which shall state the reasons therefore and shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be subject to mediation and other remedies at law or in equity.

Delete Paragraph 15.2.6 and its subparagraphs in their entirety.

15.3 MEDIATION

15.3.1 Strike "binding dispute resolution" and insert "any or all remedies at law or in equity".

15.3.2 In the first sentence, delete "administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedure in effect on the date of the Agreement," Strike "binding dispute resolution" and insert "remedies at law and in equity".

15.4 ARBITRATION

Delete Paragraph 15.4 and its sub-sections in its entirety.

END OF SUPPLEMENTARY GENERAL CONDITIONS

STATE OF DELAWARE
DEPARTMENT OF LABOR
DIVISION OF INDUSTRIAL AFFAIRS
OFFICE OF LABOR LAW ENFORCEMENT
PHONE: (302) 451-3423

Mailing Address:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

Located at:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

PREVAILING WAGES FOR BUILDING CONSTRUCTION EFFECTIVE MARCH 15, 2013

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
ASBESTOS WORKERS	21.87	26.94	39.20
BOILERMAKERS	65.47	33.22	48.83
BRICKLAYERS	46.83	46.83	46.83
CARPENTERS	50.06	50.06	39.82
CEMENT FINISHERS	27.61	29.11	21.20
ELECTRICAL LINE WORKERS	43.49	17.29	28.44
ELECTRICIANS	60.60	60.60	60.60
ELEVATOR CONSTRUCTORS	75.33	40.93	30.55
GLAZIERS	64.10	64.10	54.20
INSULATORS	51.48	51.48	51.48
IRON WORKERS	59.12	59.12	59.12
LABORERS	38.30	38.30	38.30
MILLWRIGHTS	61.13	62.18	48.75
PAINTERS	42.02	42.02	42.02
PILEDRIVERS	67.87	37.64	30.45
PLASTERERS	28.55	28.55	17.50
PLUMBERS/PIPEFITTERS/STEAMFITTERS	59.00	49.26	46.28
POWER EQUIPMENT OPERATORS	57.06	57.06	24.13
ROOFERS-COMPOSITION	21.77	17.96	19.34
ROOFERS-SHINGLE/SLATE/TILE	17.59	17.50	16.48
SHEET METAL WORKERS	62.74	62.74	62.74
SOFT FLOOR LAYERS	45.97	45.97	45.97
SPRINKLER FITTERS	51.75	51.75	51.75
TERRAZZO/MARBLE/TILE FINISHERS	51.41	51.41	45.45
TERRAZZO/MARBLE/TILE SETTERS	59.03	59.03	52.63
TRUCK DRIVERS	26.50	23.89	20.03

CERTIFIED:

3/20/13

BY:

[Signature]
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

NOTE: THESE RATES ARE PROMULGATED AND ENFORCED PURSUANT TO THE PREVAILING WAGE REGULATIONS ADOPTED BY THE DEPARTMENT OF LABOR ON APRIL 3, 1992.

CLASSIFICATIONS OF WORKERS ARE DETERMINED BY THE DEPARTMENT OF LABOR. FOR ASSISTANCE IN CLASSIFYING WORKERS, OR FOR A COPY OF THE REGULATIONS OR CLASSIFICATIONS, PHONE (302) 451-3423.

NON-REGISTERED APPRENTICES MUST BE PAID THE MECHANIC'S RATE.

PROJECT: MC4506000035 Troops 1 and 6 Renovations, New Castle County

GENERAL REQUIREMENTS

TABLE OF ARTICLES

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
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7. CHANGES IN THE WORK
8. TIME
9. PAYMENTS AND COMPLETION
10. PROTECTION OF PERSONS AND PROPERTY
11. INSURANCE AND BONDS
12. UNCOVERING AND CORRECTION OF WORK
13. MISCELLANEOUS PROVISIONS
14. TERMINATION OR SUSPENSION OF THE CONTRACT

ARTICLE 1: GENERAL

1.1 CONTRACT DOCUMENTS

1.1.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to an extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

1.1.2 Work including material purchases shall not begin until the Contractor is in receipt of a bonafide State of Delaware Purchase Order. Any work performed or material purchases prior to the issuance of the Purchase Order is done at the Contractor's own risk and cost.

1.2 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

1.2.1 For Public Works Projects financed in whole or in part by state appropriation the Contractor agrees that during the performance of this contract:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex or national origin. The Contractor will take positive steps to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, 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 agency setting forth this nondiscrimination clause.
2. 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, creed, color, sex or national origin."

ARTICLE 2: OWNER

(NO ADDITIONAL GENERAL REQUIREMENTS – SEE SUPPLEMENTARY GENERAL CONDITIONS)

ARTICLE 3: CONTRACTOR

3.1 Schedule of Values: The successful Bidder shall within twenty (20) days after receiving notice to proceed with the work, furnish to the Owner a complete schedule of values on the various items comprising the work.

- 3.2 Subcontracts: Upon approval of Subcontractors, the Contractor shall award their Subcontracts as soon as possible after the signing of their own contract and see that all material, their own and those of their Subcontractors, are promptly ordered so that the work will not be delayed by failure of materials to arrive on time.
- 3.3 Before commencing any work or construction, the General Contractor is to consult with the Owner as to matters in connection with access to the site and the allocation of Ground Areas for the various features of hauling, storage, etc.
- 3.4 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions.
- 3.5 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- 3.6 The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.
- 3.7 Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.
- 3.8 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.
- 3.9 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.
- 3.10 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.

3.11 STATE LICENSE AND TAX REQUIREMENTS

3.11.1 Each Contractor and Subcontractor shall be licensed to do business in the State of Delaware and shall pay all fees and taxes due under State laws. In conformance with Section 2503, Chapter 25, Title 30, Delaware Code, "the Contractor shall furnish the Delaware Department of Finance within ten (10) days after entering into any contract with a contractor or subcontractor not a resident of this State, a statement of total value of such contract or contracts together with the names and addresses of the contracting parties."

3.12. The Contractor shall comply with all requirements set forth in Section 6962, Chapter 69, Title 29 of the Delaware Code.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.1 CONTRACT SURETY

4.1.1 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

4.1.2 All bonds will be required as follows unless specifically waived elsewhere in the Bidding Documents.

4.1.3 Contents of Performance Bonds – The bond shall be in the form approved by the Office of Management and Budget. The bond shall be conditioned upon the faithful compliance and performance by the successful bidder of each and every term and condition of the contract and the proposal, plans, specifications, and bid documents thereof. Each term and condition shall be met at the time and in the manner prescribed by the Contract, Bid documents and the specifications, including the payment in full to every person furnishing materiel or performing labor in the performance of the Contract, of all sums of money due the person for such labor and materiel. (The bond shall also contain the successful bidder's guarantee to indemnify and save harmless the State and the agency from all costs, damages and expenses growing out of or by reason of the Contract in accordance with the Contract.)

4.1.4 Invoking a Performance Bond – The agency may, when it considers that the interest of the State so require, cause judgement to be confessed upon the bond.

4.1.5 Within twenty (20) days after the date of notice of award of contract, the Bidder to whom the award is made shall furnish a Performance Bond and Labor and Material Payment Bond, each equal to the full amount of the Contract price to guarantee the faithful performance of all terms, covenants and conditions of the same. The bonds are to be issued by an acceptable Bonding Company licensed to do business in the State of Delaware and shall be issued in duplicate.

4.1.6 Performance and Payment Bonds shall be maintained in full force (warranty bond) for a period of two (2) years after the date of the Certificate for Final Payment. The Performance Bond shall guarantee the satisfactory completion of the Project and that the Contractor will make good any faults or defects in his work which may develop during the period of said guarantees as a result of improper or defective workmanship, material or apparatus, whether furnished by themselves or their Sub-Contractors. The Payment Bond shall guarantee that the Contractor shall pay in full all persons, firms or corporations who furnish labor or material or both labor and material for, or on account of, the work included herein. The bonds shall be paid for by this Contractor. The Owner shall have the right to demand that the proof parties signing the bonds are duly authorized to do so.

4.2 **FAILURE TO COMPLY WITH CONTRACT**

4.2.1 If any firm entering into a contract with the State, or Agency that neglects or refuses to perform or fails to comply with the terms thereof, the Agency which signed the Contract may terminate the Contract and proceed to award a new contract in accordance with this Chapter 69, Title 29 of the Delaware Code or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond. Nothing herein shall preclude the Agency from pursuing additional remedies as otherwise provided by law.

4.3 **CONTRACT INSURANCE AND CONTRACT LIABILITY**

4.3.1 In addition to the bond requirements stated in the Bid Documents, each successful Bidder shall purchase adequate insurance for the performance of the Contract and, by submission of a Bid, agrees to indemnify and save harmless and to defend all legal or equitable actions brought against the State, any Agency, officer and/or employee of the State, for and from all claims of liability which is or may be the result of the successful Bidder's actions during the performance of the Contract.

4.3.2 The purchase or nonpurchase of such insurance or the involvement of the successful Bidder in any legal or equitable defense of any action brought against the successful Bidder based upon work performed pursuant to the Contract will not waive any defense which the State, its agencies and their respective officers, employees and agents might otherwise have against such claims, specifically including the defense of sovereign immunity, where applicable, and by the terms of this section, the State and all agencies, officers and employees thereof shall not be financially responsible for the consequences of work performed, pursuant to said contract.

4.4 **RIGHT TO AUDIT RECORDS**

4.4.1 The Owner shall have the right to audit the books and records of a Contractor or any Subcontractor under any Contract or Subcontract to the extent that the books and records relate to the performance of the Contract or Subcontract.

4.4.2 Said books and records shall be maintained by the Contractor for a period of seven (7) years from the date of final payment under the Prime Contract and by the Subcontractor for a period of seven (7) years from the date of final payment under the Subcontract.

ARTICLE 5: SUBCONTRACTORS

5.1 SUBCONTRACTING REQUIREMENTS

5.1.1 All contracts for the construction, reconstruction, alteration or repair of any public building (not a road, street or highway) shall be subject to the following provisions:

1. A contract shall be awarded only to a Bidder whose Bid is accompanied by a statement containing, for each Subcontractor category, the name and address (city or town and State only – street number and P.O. Box addresses not required) of the subcontractor whose services the Bidder intends to use in performing the Work and providing the material for such Subcontractor category.
2. A Bid will not be accepted nor will an award of any Contract be made to any Bidder which, as the Prime Contractor, has listed itself as the Subcontractor for any Subcontractor unless:
 - A. It has been established to the satisfaction of the awarding Agency that the Bidder has customarily performed the specialty work of such Subcontractor category by artisans regularly employed by the Bidder's firm;
 - B. That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and
 - C. That the Bidder is recognized in the industry as a bona fide Subcontractor or Contractor in such specialty work and Subcontractor category.

5.1.2 The decision of the awarding Agency as to whether a Bidder who list itself as the Subcontractor for a Subcontractor category shall be final and binding upon all Bidders, and no action of any nature shall lie against any awarding agency or its employees or officers because of its decision in this regard.

5.1.3 After such a Contract has been awarded, the successful Bidder shall not substitute another Subcontractor for any Subcontractor whose name was set forth in the statement which accompanied the Bid without the written consent of the awarding Agency.

5.1.4 No Agency shall consent to any substitution of Subcontractors unless the Agency is satisfied that the Subcontractor whose name is on the Bidders accompanying statement:

- A. Is unqualified to perform the work required;
- B. Has failed to execute a timely reasonable Subcontract;
- C. Has defaulted in the performance on the portion of the work covered by the Subcontract; or
- D. Is no longer engaged in such business.

5.2 PENALTY FOR SUBSTITUTION OF SUBCONTRACTORS

5.2.1 Should the Contractor fail to utilize any or all of the Subcontractors in the Contractor's Bid statement in the performance of the Work on the public bidding, the Contractor shall be penalized in the amount of (project specific amount*). The Agency may determine to deduct payments of the penalty from the Contractor or have the amount paid directly to the Agency. Any penalty amount assessed against the Contractor may be remitted or refunded, in whole or in part, by the Agency awarding the Contract, only if it is established to the satisfaction of the Agency that the Subcontractor in question has defaulted or is no longer engaged in such business. No claim for the remission or refund of any penalty shall be granted unless an application is filed within one year after the liability of the successful Bidder accrues. All penalty amounts assessed and not refunded or remitted to the contractor shall be reverted to the State.

*one (1) percent of contract amount not to exceed \$10,000

5.3 ASBESTOS ABATEMENT

5.3.1 The selection of any Contractor to perform asbestos abatement for State-funded projects shall be approved by the Office of Management and Budget, Division of Facilities Management pursuant to Chapter 78 of Title 16.

5.4 STANDARDS OF CONSTRUCTION FOR THE PROTECTION OF THE
PHYSICALLY HANDICAPPED

5.4.1 All Contracts shall conform with the standard established by the Delaware Architectural Accessibility Board unless otherwise exempted by the Board.

5.5 CONTRACT PERFORMANCE

5.5.1 Any firm entering into a Public Works Contract that neglects or refuses to perform or fails to comply with its terms, the Agency may terminate the Contract and proceed to award a new Contract or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond.

ARTICLE 6: CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

6.1 The Owner reserves the right to simultaneously perform other construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other Projects at the same site.

6.2 The Contractor shall afford the Owner and other Contractors reasonable opportunity for access and storage of materials and equipment, and for the performance of their activities, and shall connect and coordinate their activities with other forces as required by the Contract Documents.

ARTICLE 7: CHANGES IN THE WORK

- 7.1 The Owner, without invalidating the Contract, may order changes in the Work consisting of Additions, Deletions, Modifications or Substitutions, with the Contract Sum and Contract completion date being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Professional, as the duly authorized agent, the Contractor and the Owner.
- 7.2 The Contract Sum and Contract Completion Date shall be adjusted only by a fully executed Change Order.
- 7.3 The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the 'DPE' wages required and the "invoice price" of the materials/equipment needed.
- 7.3.1 "DPE" shall be defined to mean "direct personnel expense": Direct payroll expense includes direct salary plus customary fringe benefits (prevailing wage rates) and documented statutory costs such as workman's compensation insurance, Social Security/Medicare, and unemployment insurance (a maximum multiplier of 1.35 times DPE).
- 7.3.2 "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor, (or subcontractor), to a material distributor, direct factory vendor, store, material provider, or equipment leasing entity. Rates for equipment that is leased and/or owned by the Contractor or subcontractor(s) shall not exceed those listed in the latest version of the "Means Building Construction Cost Data" publication.
- 7.3.3 In addition to the above, the General Contractor is allowed a fifteen percent (15%) markup for overhead and profit for additional work performed by the General Contractor's own forces. For additional subcontractor work, the Subcontractor is allowed a fifteen (15) percent overhead and profit on change order work above and beyond the direct costs stated previously. To this amount, the General Contractor will be allowed a mark-up not exceeding seven and one half percent (7.5%) on the subcontractors work. These mark-ups shall include all costs including, but not limited to: overhead, profit, bonds, insurance, supervision, etc. No markup is permitted on the work of the subcontractors subcontractor. No additional costs shall be allowed for changes related to the Contractor's onsite superintendent/staff, or project manager, unless a change in the work changes the project duration and is identified by the CPM schedule. There will be no other costs associated with the change order.

ARTICLE 8: TIME

- 8.1 Time limits, if any, are as stated in the Project Manual. By executing the Agreement, the Contractor confirms that the stipulated limits are reasonable, and that the Work will be completed within the anticipated time frame.

8.2 If progress of the Work is delayed at any time by changes ordered by the Owner, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions, unavoidable casualties or other causes beyond the Contractor's control, the Contract Time shall be extended for such reasonable time as the Owner may determine.

8.3 Any extension of time beyond the date fixed for completion of the construction and acceptance of any part of the Work called for by the Contract, or the occupancy of the building by the Owner, in whole or in part, previous to the completion shall not be deemed a waiver by the Owner of his right to annul or terminate the Contract for abandonment or delay in the matter provided for, nor relieve the Contractor of full responsibility.

8.4 **SUSPENSION AND DEBARMENT**

8.4.1 Per Section 6962(d)(14), Title 29, Delaware Code, "Any Contractor who fails to perform a public works contract or complete a public works project within the time schedule established by the Agency in the Invitation To Bid, may be subject to Suspension or Debarment for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the Project."

8.4.2 "Upon such failure for any of the above stated reasons, the Agency that contracted for the public works project may petition the Director of the Office of Management and Budget for Suspension or Debarment of the Contractor. The Agency shall send a copy of the petition to the Contractor within three (3) working days of filing with the Director. If the Director concludes that the petition has merit, the Director shall schedule and hold a hearing to determine whether to suspend the Contractor, debar the Contractor or deny the petition. The Agency shall have the burden of proving, by a preponderance of the evidence, that the Contractor failed to perform or complete the public works project within the time schedule established by the Agency and failed to do so for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the project. Upon a finding in favor of the Agency, the Director may suspend a Contractor from Bidding on any project funded, in whole or in part, with public funds for up to 1 year for a first offense, up to 3 years for a second offense and permanently debar the Contractor for a third offense. The Director shall issue a written decision and shall send a copy to the Contractor and the Agency. Such decision may be appealed to the Superior Court within thirty (30) days for a review on the record."

8.5 **RETAINAGE**

8.5.1 Per Section 6962(d)(5) a.3, Title 29, Delaware Code: The Agency may at the beginning of each public works project establish a time schedule for the completion of the project. If the project is delayed beyond the completion date due to the Contractor's failure to meet their responsibilities, the Agency may forfeit, at its discretion, all or part of the Contractor's retainage.

- 8.5.2 This forfeiture of retainage also applies to the timely completion of the punchlist. A punchlist will only be prepared upon the mutual agreement of the Owner, Architect and Contractor. Once the punchlist is prepared, all three parties will by mutual agreement, establish a schedule for its completion. Should completion of the punchlist be delayed beyond the established date due to the Contractor's failure to meet their responsibilities, the Agency may hold permanently, at its discretion, all or part of the Contractor's retainage.

ARTICLE 9: PAYMENTS AND COMPLETION

9.1 APPLICATION FOR PAYMENT

- 9.1.1 Applications for payment shall be made upon AIA Document G702. There will be a five percent (5%) retainage on all Contractor's monthly invoices until completion of the project. This retainage may become payable upon receipt of all required closeout documentation, provided all other requirements of the Contract Documents have been met.
- 9.1.2 A date will be fixed for the taking of the monthly account of work done. Upon receipt of Contractor's itemized application for payment, such application will be audited, modified, if found necessary, and approved for the amount. Statement shall be submitted to the Owner.
- 9.1.3 Section 6516, Title 29 of the Delaware Code annualized interest is not to exceed 12% per annum beginning thirty (30) days after the "presentment" (as opposed to the date) of the invoice.

9.2 PARTIAL PAYMENTS

- 9.2.1 Any public works Contract executed by any Agency may provide for partial payments at the option of the Owner with respect to materials placed along or upon the sites or stored at secured locations, which are suitable for use in the performance of the contract.
- 9.2.2 When approved by the agency, partial payment may include the values of tested and acceptable materials of a nonperishable or noncontaminative nature which have been produced or furnished for incorporation as a permanent part of the work yet to be completed, provided acceptable provisions have been made for storage.
- 9.2.2.1 Any allowance made for materials on hand will not exceed the delivered cost of the materials as verified by invoices furnished by the Contractor, nor will it exceed the contract bid price for the material complete in place.
- 9.2.3 If requested by the Agency, receipted bills from all Contractors, Subcontractors, and material, men, etc., for the previous payment must accompany each application for payment. Following such a request, no payment will be made until these receipted bills have been received by the Owner.

9.3 SUBSTANTIAL COMPLETION

- 9.3.1 When the building has been made suitable for occupancy, but still requires small items of miscellaneous work, the Owner will determine the date when the project has been substantially completed.

- 9.3.2 If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and without terminating the Contract, the Owner may make payment of the balance due for the portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment that it shall not constitute a waiver of claims.
- 9.3.3 On projects where commissioning is included, the commissioning work as defined in the specifications must be complete prior to the issuance of substantial completion.
- 9.4 FINAL PAYMENT
- 9.4.1 Final payment, including the five percent (5%) retainage if determined appropriate, shall be made within thirty (30) days after the Work is fully completed and the Contract fully performed and provided that the Contractor has submitted the following closeout documentation (in addition to any other documentation required elsewhere in the Contract Documents):
- 9.4.1.1 Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid,
- 9.4.1.2 An acceptable RELEASE OF LIENS,
- 9.4.1.3 Copies of all applicable warranties,
- 9.4.1.4 As-built drawings,
- 9.4.1.5 Operations and Maintenance Manuals,
- 9.4.1.6 Instruction Manuals,
- 9.4.1.7 Consent of Surety to final payment.
- 9.4.1.8 The Owner reserves the right to retain payments, or parts thereof, for its protection until the foregoing conditions have been complied with, defective work corrected and all unsatisfactory conditions remedied.

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

- 10.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions to prevent damage, injury or loss to: workers, persons nearby who may be affected, the Work, materials and equipment to be incorporated, and existing property at the site or adjacent thereto. The Contractor shall give notices and comply with applicable laws ordinances, rules regulations, and lawful orders of public authorities bearing on the safety of persons and property and their protection from injury, damage, or loss. The Contractor shall promptly remedy damage and loss to property at the site caused in whole or in part by the Contractor, a Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable.

- 10.2 The Contractor shall notify the Owner in the event any existing hazardous material such as lead, PCBs, asbestos, etc. is encountered on the project. The Owner will arrange with a qualified specialist for the identification, testing, removal, handling and protection against exposure or environmental pollution, to comply with applicable regulation laws and ordinances. The Contractor and Architect will not be required to participate in or to perform this operation. Upon completion of this work, the Owner will notify the Contractor and Architect in writing the area has been cleared and approved by the authorities in order for the work to proceed. The Contractor shall attach documentation from the authorities of said approval.
- 10.3 As required in the Hazardous Chemical Information Act of June 1984, all vendors supplying any materials that may be defined as hazardous, must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a warning caution on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in any foreseeable emergency situation. Material Safety Data Sheets must be provided directly to the Owner along with the shipping slips that include those products.
- 10.4 The Contractor shall certify to the Owner that materials incorporated into the Work are free of all asbestos. This certification may be in the form of Material Safety Data Sheet (MSDS) provided by the product manufacturer for the materials used in construction, as specified or as provided by the Contractor.

ARTICLE 11: INSURANCE AND BONDS

- 11.1 The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. The Contractor shall carry such insurance coverage as they desire on their own property such as a field office, storage sheds or other structures erected upon the project site that belong to them and for their own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.
- 11.2 Upon being awarded the Contract, the Contractor shall obtain a minimum of two (2) copies of all required insurance certificates called for herein, and submit one (1) copy of each certificate, to the Owner, within 20 days of contract award.
- 11.3 Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverages shall be filed with and approved by the Owner.
- 11.4 The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by the Contractor or their Subcontractors during the entire construction period on this project.

11.5 Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, shall not be provided by the Contractor under this contract. The Owner shall insure the existing building and all of its contents and all this new alteration work under this contract during entire construction period for the full insurable value of the entire work at the site. Note, however, that the Contractor and their Subcontractors shall be responsible for insuring building materials (installed and stored) and their tools and equipment whenever in use on the project, against fire damage, theft, vandalism, etc.

11.6 Certificates of the insurance company or companies stating the amount and type of coverage, terms of policies, etc., shall be furnished to the Owner, within 20 days of contract award.

11.7 The Contractor shall, at their own expense, (in addition to the above) carry the following forms of insurance:

11.7.1 Contractor's Contractual Liability Insurance

Minimum coverage to be:

Bodily Injury	\$500,000 \$1,000,000 \$1,000,000	for each person for each occurrence aggregate
Property Damage	\$500,000 \$1,000,000	for each occurrence aggregate

11.7.2 Contractor's Protective Liability Insurance

Minimum coverage to be:

Bodily Injury	\$500,000 \$1,000,000 \$1,000,000	for each person for each occurrence aggregate
Property Damage	\$500,000 \$500,000	for each occurrence aggregate

11.7.3 Automobile Liability Insurance

Minimum coverage to be:

Bodily Injury	\$1,000,000 \$1,000,000	for each person for each occurrence
Property Damage	\$500,000	per accident

11.7.4 Prime Contractor's and Subcontractors' policies shall include contingent and contractual liability coverage in the same minimum amounts as 11.7.1 above.

11.7.5 Workmen's Compensation (including Employer's Liability):

- 11.7.5.1 Minimum Limit on employer's liability to be as required by law.
- 11.7.5.2 Minimum Limit for all employees working at one site.
- 11.7.6 Certificates of Insurance must be filed with the Owner guaranteeing fifteen (15) days prior notice of cancellation, non-renewal, or any change in coverages and limits of liability shown as included on certificates.
- 11.7.7 Social Security Liability
- 11.7.7.1 With respect to all persons at any time employed by or on the payroll of the Contractor or performing any work for or on their behalf, or in connection with or arising out of the Contractor's business, the Contractor shall accept full and exclusive liability for the payment of any and all contributions or taxes or unemployment insurance, or old age retirement benefits, pensions or annuities now or hereafter imposed by the Government of the United States and the State or political subdivision thereof, whether the same be measured by wages, salaries or other remuneration paid to such persons or otherwise.
- 11.7.7.2 Upon request, the Contractor shall furnish Owner such information on payrolls or employment records as may be necessary to enable it to fully comply with the law imposing the aforesaid contributions or taxes.
- 11.7.7.3 If the Owner is required by law to and does pay any and/or all of the aforesaid contributions or taxes, the Contractor shall forthwith reimburse the Owner for the entire amount so paid by the Owner.

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

- 12.1 The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of two years from the date of Substantial Completion, or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article apply to work done by Subcontractors as well as to Work done by direct employees of the Contractor.
- 12.2 At any time during the progress of the work, or in any case where the nature of the defects shall be such that it is not expedient to have them corrected, the Owner, at their option, shall have the right to deduct such sum, or sums, of money from the amount of the contract as they consider justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

ARTICLE 13: MISCELLANEOUS PROVISIONS

- 13.1 CUTTING AND PATCHING
- 13.1.1 The Contractor shall be responsible for all cutting and patching. The Contractor shall coordinate the work of the various trades involved.

13.2 DIMENSIONS

13.2.1 All dimensions shown shall be verified by the Contractor by actual measurements at the project site. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the Owner for adjustment before any work affected thereby has been performed.

13.3 LABORATORY TESTS

13.3.1 Any specified laboratory tests of material and finished articles to be incorporated in the work shall be made by bureaus, laboratories or agencies approved by the Owner and reports of such tests shall be submitted to the Owner. The cost of the testing shall be paid for by the Contractor.

13.3.2 The Contractor shall furnish all sample materials required for these tests and shall deliver same without charge to the testing laboratory or other designated agency when and where directed by the Owner.

13.4 ARCHAEOLOGICAL EVIDENCE

13.4.1 Whenever, in the course of construction, any archaeological evidence is encountered on the surface or below the surface of the ground, the Contractor shall notify the authorities of the Delaware Archaeological Board and suspend work in the immediate area for a reasonable time to permit those authorities, or persons designated by them, to examine the area and ensure the proper removal of the archaeological evidence for suitable preservation in the State Museum.

13.5 GLASS REPLACEMENT AND CLEANING

13.5.1 The General Contractor shall replace without expense to the Owner all glass broken during the construction of the project. If job conditions warrant, at completion of the job the General Contractor shall have all glass cleaned and polished.

13.6 WARRANTY

13.6.1 For a period of two (2) years from the date of substantial completion, as evidenced by the date of final acceptance of the work, the contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect of equipment, material or workmanship performed by the contractor or any of his subcontractors or suppliers. However, manufacturer's warranties and guarantees, if for a period longer than two (2) years, shall take precedence over the above warranties. The contractor shall remedy, at his own expense, any such failure to conform or any such defect. The protection of this warranty shall be included in the Contractor's Performance Bond.

ARTICLE 14: TERMINATION OF CONTRACT

- 14.1 If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days written notice to the Contractor, may make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the costs of finishing the Work exceed any unpaid compensation due the Contractor, the Contractor shall pay the difference to the Owner.
- 14.2 “If the continuation of this Agreement is contingent upon the appropriation of adequate state, or federal funds, this Agreement may be terminated on the date beginning on the first fiscal year for which funds are not appropriated or at the exhaustion of the appropriation. The Owner may terminate this Agreement by providing written notice to the parties of such non-appropriation. All payment obligations of the Owner will cease upon the date of termination. Notwithstanding the foregoing, the Owner agrees that it will use its best efforts to obtain approval of necessary funds to continue the Agreement by taking appropriate action to request adequate funds to continue the Agreement.”

END OF GENERAL REQUIREMENTS

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Work covered by the Contract Documents.
 2. Work phases.
 3. Work under other contracts.
 4. Use of premises.
 5. Owner's occupancy requirements.
 6. Specification formats and conventions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: **DELAWARE STATE POLICE TROOPS 1 & 6 – RENOVATIONS - OMB/DFM Contract No. MC4506000035**
1. Project Location: Troop 1, 605 Philadelphia Pike, Wilmington, DE 19809 and Troop 6, 3301 Kirkwood Highway, Wilmington, DE 19808
- B. Owner: State of Delaware, Department of Safety and Homeland Security, Division of State Police, 1441 N. DuPont Highway, P.O. Box 430 , Dover, DE 19903
- C. Owner's Representative: Richard Gazeski
- D. Architect: Delaware Architects, LLC, 550 S. DuPont Blvd., Suite E, Milford, Delaware 19963.
- E. The Work consists of the following:
1. The Work includes the demolition and removal of two bathroom interiors, the demolition and removal of masonry stairs, the renovation of demolished space for use as a kitchenette, the construction of a bathroom, the replacement of the existing Garage windows, and the installation of an oil sand inceptor at Troop 1. Project involves the repointing of miscellaneous brick veneer, the repair of the existing membrane roof, the replacement of the existing sheet metal coping, sealing with an epoxy finish of the existing exterior concrete entrance plaza, the replacement of the existing aluminum windows in both the Main Building and Garage, the cleaning and painting of all existing steel brick shelf angles at Troop 6.
- F. Project will be constructed under a single prime contract.

1.3 USE OF PREMISES

- A. General: Contractor shall have limited use of premises for construction operations as directed by the Owner.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to those areas as indicated on the drawings.
 - 2. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.
 - 3. Maintain access to existing walkways, drives, parking areas, and other adjacent site amenities as well as occupied or used buildings and facilities. Do not close or obstruct walkways, or other occupied buildings or used facilities without written permission from Owner.
 - 4. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.4 OPERATIONS AND STORAGE AREAS

- A. Coordination of Work with the Owner's Representative to cause the least possible interference with building activities,
- B. The Contractor shall confine all operations (including storage of materials) on to areas authorized or approved by the Owner's Representative. The Contractor shall hold and save the Department of Corrections and the State of Delaware, its officers and agents, free and harmless from liability of any nature resulting from the Contractor's performance and/or negligence. It is understood that the Department of Corrections and the State of Delaware shall not be held responsible for any damage to the Contractor's equipment, materials, supplies or the like which may result from vandalism, theft etc. while on site.
- C. The Contractor shall, under regulations prescribed by the Owner's Representative, use only established roadways.
- D. When materials are transported in performance of work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- E. The Owner's Representative shall designate working space and space available for storing materials. Unless otherwise indicated on drawings as the Contractor's "Staging Area", all working and storage space must be approved by the Owner's Representative prior to its use.
- F. Contract personnel are subject to the State of Delaware rules of conduct
- G. Contractor shall execute work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of construction materials, debris, standing construction

equipment and vehicles at all times. Materials and Equipment shall not be stored in other than assigned areas.

1.5 WORK RESTRICTIONS

- A. Required Stoppage of Work: All construction activities must cease during all funerals in progress including the gun salute. Owner will provide a weekly schedule of scheduled funerals.
- B. Federal Holidays: No construction related work will be allowed on Federal Holidays.

1.6 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. See Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price No. 01 – Repointing – rake out, clean and repoint brick joints for a 10 square foot area.

**DELAWARE STATE POLICE TROOPS 1 & 6
RENOVATIONS**

**DA LLC NO. 012-014
STATE NO. MC4506000035**

END OF SECTION 01 22 00

CANNOT BE USED FOR BIDDING.

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. See applicable Specification Sections for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

TROOP 1 –

Alternate No. 1: REPLACE GARAGE WINDOWS – Provide labor and materials to remove existing aluminum frames, sash and glazing. Install new thermally improved aluminum frames and sash with insulating glazing units as indicated on the drawings and specifications.

Alternate No. 2: DEMOLISH EXISTING PUBLIC RESTROOMS AND STAIRS – Provide labor and materials to demolish and remove the existing Public Rest Rooms and exterior masonry stairs. Infill existing door openings. Renovate demolished space into a new Break Room as indicated on the drawings and specifications. Demolish existing closet and surrounding space in Lieutenant's Office and Lobby. Build new ADA compliant Public Restroom as indicated on drawings and specifications.

Alternate No. 3: NEW OIL-SAND INCEPTOR – Provide labor and materials needed to install a new underground oil-sand inceptor as indicated on drawings and specifications.

TROOP 6 –

Alternate No. 4: REPOINT, REPAIR, RESET EXISTING BRICK – Provide labor and materials required to repoint, repair or reset existing brick veneer as indicated on the drawings and specifications.

Alternate No. 5: REPAIR ROOFING SEAMS AND PATCHES – Provide labor and materials as required to seal existing seams and patches, secure edges of existing EPDM roof as indicated on drawings and specifications.

Alternate No. 6: RESEAL FRONT DECK – Provide labor and materials as required to prep and seal existing front deck as indicated on drawings and specifications.

Alternate No. 7: REPLACE MAIN BUILDING WINDOWS - Provide labor and materials to remove existing aluminum frames, sash and glazing. Install new thermally improved aluminum frames and sash with insulating glazing units as indicated on the drawings and specifications

Alternate No. 8: REPLACE GARAGE WINDOWS - Provide labor and materials to remove existing aluminum frames, sash and glazing. Install new thermally improved aluminum frames and sash with insulating glazing units as indicated on the drawings and specifications.

Alternate No. 9: CLEAN & PAINT STEEL SHELF ANGLES – Provide labor and materials to clean all existing steel shelf angles on the Main Building and the Garage to bare metal, treat with rust inhibitor, prime and paint as indicated on drawings and specifications.

END OF SECTION 01 23 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. See Division 01 Section "Unit Prices" for administrative requirements for using unit prices.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.3 PROPOSAL REQUESTS

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

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

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

1.4 ALLOWANCES

A. Allowances are not considered as part of this contract.

1.5 CHANGE ORDER PROCEDURES

- A. A Change Order that results in added cost to the project must be approved by Owner/Architect.
- B. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets Submittals Schedule and Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than 15 days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Submit draft of AIA Document G703 Continuation Sheets.
 - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Progress payments shall be submitted to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated Schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 5 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. Submittals Schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Project meetings.
 - 3. Requests for Interpretation (RFIs).
- B. See Division 01 Section "Multiple Contract Summary" for a description of the division of Work among separate contracts and responsibility for coordination activities not in this Section.
- C. See Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit five opaque copies of each submittal. Architect will return one copy.
 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.5 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Architect will record significant discussions and agreements achieved. Architect will distribute the meeting minutes to everyone concerned, including Owner, Contractor and VCGS, within five days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. LEED requirements.
 - l. Preparation of Record Documents.
 - m. Use of the premises.
 - n. Work restrictions.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Construction waste management and recycling.
 - r. Parking availability.
 - s. Office, work, and storage areas.
 - t. Equipment deliveries and priorities.
 - u. First aid.
 - v. Security.
 - w. Progress cleaning.
 - x. Working hours.
 3. Minutes: Architect will record and distribute meeting minutes to everyone concerned, including Owner, Contractor and VCGS.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule,

in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Minutes: Architect will record and distribute meeting minutes to everyone concerned, including Owner, Contractor and VCGS.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.6 REPORTING REQUIREMENTS

- A. The Contractor is required to check-in with the Cemetery Director (or designee) at the Cemetery on a weekly basis (or as otherwise agreed upon). The Contractor will provide the Cemetery Director with an anticipated work schedule, and the Cemetery Director will furnish the Contractor with a schedule of funerals and/or special events. This weekly check-in is mandatory and may not be accomplished by telephone or e-mail.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- C. Hard-Copy RFIs: CSI Form 13.2A.
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

CANNOT BE USED FOR BIDDING.

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Submittals Schedule.
 - 3. Daily construction reports.
 - 4. Monthly Progress reports.
 - 5. Field condition reports.
- B. See Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
- C. See Division 01 Section "Photographic Documentation" for submitting construction photographs.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
- E. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

- F. Major Area: A story of construction, a separate building, or a similar significant construction element.

1.3 SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Architect's final release or approval.
- B. Preliminary Network Diagram: Submit two opaque copies, large enough to show entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
 - 1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- D. Daily Construction Reports: Submit two copies at weekly intervals.
- E. Monthly Construction Progress Report: Submit three copies along with Request for Payment.
- F. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

1.4 COORDINATION

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

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include the appropriate number of days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.

- b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
5. Work Stages: Indicate important stages of construction for each major portion of the Work.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANIT CHART)
- A. Bar Graph Schedule: Submit a comprehensive, fully developed, horizontal Bar Graph, Contractor's Construction Schedule within 10 days of date established for the Notice of Award. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
- 2.4 REPORTS
- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. Equipment at Project site.
 3. Material deliveries.
 4. High and low temperatures and general weather conditions.
 5. Accidents.
 6. Stoppages, delays, shortages, and losses.
 7. Orders and requests of authorities having jurisdiction.
 8. Services connected and disconnected.
- B. Monthly Construction Progress Reports: Prepare a monthly construction report to be submitted along with requests for payment. Three copies of the Monthly Construction Progress Reports shall be submitted to the Architect. The Architect will distribute report to Owner and VCGS.

Monthly Construction Progress Reports shall record the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.
5. Accidents.
6. Stoppages, delays, shortages, and losses.
7. Orders and requests of authorities having jurisdiction.
8. Services connected and disconnected.

- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices if applicable.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
- B. See Division 01 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.
- C. See Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

1.2 SUBMITTALS

- A. Key Plan: Submit key plan of Project Site with notation of vantage points marked for location and direction of each photograph. Indicate location (Section and Field) of construction. Include same label information as corresponding set of photographs.
- B. Construction Photographs: Submit one file of each photographic view within seven days of taking photographs.
 - 1. Format: Digital. Keep all photographic images on a CD disc on site for review.
 - 2. Identification: In a corresponding log, provide the following information keyed to each photo file:
 - a. Name of Project.
 - b. Name of Architect.
 - c. Name of Contractor.
 - d. Date and time of day photograph was taken if not date stamped by camera.
 - e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - f. Unique sequential identifier.
 - 3. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.3 COORDINATION

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.4 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in filename for each image.
 - 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.
- C. Preconstruction Photographs: Before starting construction, take, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag excavation areas and construction limits before taking construction photographs.
 - 2. Take a minimum of eight photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take a minimum of eight photographs of adjoining fields to accurately record physical conditions at start of construction.
- D. Periodic Construction Photographs: Take 12, digital photographs bi-weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken. Photographs must accompany each monthly request for payment.

- E. Additional Photographs: Architect may issue requests for additional photographs, in addition to periodic photographs specified.
1. Three days' notice will be given, where feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

END OF SECTION 01 32 33

CANNOT BE USED FOR BIDDING.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.
- C. See Division 01 Section "Photographic Documentation" for submitting construction photographs.
- D. See Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
- E. See Division 01 Section "Closeout Procedures" for submitting warranties.
- F. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.2 DEFINITIONS

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

1.3 SUBMITTAL PROCEDURES

- A. Coordination. Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

1. Transmittal Form: Use AIA Document G810 or CSI Form 12.1A.
 - H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked "Approved or Approved as noted"
 - I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
 - J. Use for Construction: Use only final submittals with mark indicating " Approved or Approved as noted " taken by Architect.
- 1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES
- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 1. Contractor must provide Delaware Architects, LLC (DALLC) with an executed release of liability form as provide by DALLC.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Compliance with specified referenced standards.
 - i. Testing by recognized testing agency.

4. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional engineer if specified.
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit two opaque (bond) copies of each submittal. Architect will return one copy.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmittal: Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

- a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
 1. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.
- F. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
 1. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

- B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Statement on condition of substrates and their acceptability for installation of product.
 - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- U. Construction Photographs: Comply with requirements specified in Division 01 Section "Photographic Documentation."
- V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
 - 1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

2.3 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. "Approved" or "Approved as noted" indicates "Fabrication/Installation may be undertaken. Approval does not authorize changes to the Contract Sum or Contract Time" Nor does it relieve the contractor from their responsibility for review and verification that submittal meets the requirements set forth in the construction documents.
 - 2. "Revise and Resubmit" or "Rejected" indicates "Fabrication and/or installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.
 - 3. Review/approval neither extends nor alters any contractual obligations of the Architect/Engineer or Contractor.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.3 REQUIRED SUBMISSIONS

- A. The architect will issue a submittal log to the contractor for required submittals.

END OF SECTION 01 33 00

CANNOT BE USED FOR BIDDING.

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. See Divisions 02 through 33 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.

8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- H. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.6 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.7 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

CANNOT BE USED FOR BIDDING.

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute

AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (The American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association

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(Now WCSC)

AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRRC	Cool Roof Rating Council
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association

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CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals
FM Global	FM Global (Formerly: FMG - FM Global)
FMRC	Factory Mutual Research (Now FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal

GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute

MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations

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NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute

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RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPED - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society

TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTECH	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

BOCA	BOCA International, Inc. (See ICC)
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials

(See ICC)

ICBO ES ICBO Evaluation Service, Inc.
(See ICC-ES)

ICC International Code Council

ICC-ES ICC Evaluation Service, Inc.

SBCCI Southern Building Code Congress International, Inc.
(See ICC)

UBC Uniform Building Code
(See ICC)

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

CE Army Corps of Engineers

CPSC Consumer Product Safety Commission

DOC Department of Commerce

DOD Department of Defense

DOE Department of Energy

EPA Environmental Protection Agency

FAA Federal Aviation Administration

FCC Federal Communications Commission

FDA Food and Drug Administration

GSA General Services Administration

HUD Department of Housing and Urban Development

LBL Lawrence Berkeley National Laboratory

NCHRP National Cooperative Highway Research Program
(See TRB)

NIST National Institute of Standards and Technology

OSHA Occupational Safety & Health Administration

PBS Public Building Service

(See GSA)

PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board
USDA	Department of Agriculture
USPS	Postal Service

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA)
CFR	Code of Federal Regulations
DOD	Department of Defense Military Specifications and Standards
DSCC	Defense Supply Center Columbus (See FS)
FED-STD	Federal Standard (See FS)
FS	Federal Specification
FTMS	Federal Test Method Standard (See FS)
MIL	(See MILSPEC)
MIL-STD	(See MILSPEC)
MILSPEC	Military Specification and Standards
UFAS	Uniform Federal Accessibility Standards

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

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CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and
Thermal Insulation

CCR California Code of Regulations

CPUC California Public Utilities Commission

TFS Texas Forest Service
Forest Resource Development

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

CANNOT BE USED FOR BIDDING.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. See Division 01 Section "Execution" for progress cleaning requirements.
- C. See Divisions 02 through 33 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
- D. See Division 31 Section "Dewatering" for disposal of ground water at Project site.

1.2 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service: Water from Owner's existing water system is available for irrigation and construction use, not cleaning of marker headstones, without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Owner. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its own expense upon completion of the work.
- C. Fence: Before work operations begin, Contractor shall provide a chain link fence, six feet in height and no more, around the staging area. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 15 inches. Bottom of fences shall extend to one inch above grade.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to private system indicated as directed by authorities having jurisdiction.
- C. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. It is the responsibility of the Contractor to provide water for the newly installed sod as part of this contract. The Contractor may utilize water provided by the Owner via the existing irrigation system, or tanks/water trucks filled offsite as necessary to transport water to areas where needed in order to complete the work required by this contract. Any water that the Contractor obtains from the cemetery will not need to be metered and will not be charged to Contractor.
 - 1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
- G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 - 1. Provide additional telephone lines for the following:

- a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
 2. At each telephone, post a list of important telephone numbers including police and fire departments Contractor's home office Architect's office Owner's office Principal subcontractors' field and home offices.
 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- H. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Contractor shall utilize existing paved and gravel roads **only**. The construction of temporary roads paths etc. shall **not** be permitted.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Use designated areas as shown on drawings for parking areas for construction personnel.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- F. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
1. Provide temporary, directional signs for construction personnel and visitors.
 2. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
 - 1. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.**
1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable

product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
- b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:

1. **Product:** Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. **Manufacturer/Source:** Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. **Products:** Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. **Manufacturers:** Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. **Available Products:** Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. **Available Manufacturers:** Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. **Product Options:** Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. **Basis-of-Design Product:** Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. **Visual Matching Specification:** Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. **Full Range:** Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 15 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. See Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and

verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a licensed Professional Land Surveyor, registered in the State of Delaware, to lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall be used to restore any grave section corner monuments that may be disturbed because of the Contractor's work performance.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 - E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 - F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
 - H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 - I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 - J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.7 PROTECTION OF INSTALLED CONSTRUCTION
- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
 - B. Comply with manufacturer's written instructions for temperature and relative humidity.
- 3.8 CORRECTION OF THE WORK
- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
 - B. Restore permanent facilities used during construction to their specified condition.
 - C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

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- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

CANNOT BE USED FOR BIDDING.

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. See Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.2 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

- A. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
- B. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes: Administrative and procedural requirements for construction waste management activities.

1.2 DEFINITIONS

- A. Construction, Demolition, and Land clearing (CDL) Waste: Includes all non-hazardous solid wastes resulting from construction, remodeling, alterations, repair, demolition and land clearing. Includes material that is recycled, reused, salvaged or disposed as garbage.
- B. Salvage: Recovery of materials for on-site reuse, sale or donation to a third party.
- C. Reuse: Making use of a material without altering its form. Materials can be reused on-site or reused on other projects off-site. Examples include, but are not limited to the following: Crushing or grinding of concrete for use as sub-base material. Chipping of land clearing debris for use as mulch.
- D. Recycling: The process of sorting, cleaning, treating and reconstituting materials for the purpose of using the material in the manufacture of a new product.
- E. Source-Separated CDL Recycling: The process of separating recyclable materials in separate containers as they are generated on the job-site. The separated materials are hauled directly to a recycling facility or transfer station.
- F. Co-mingled CDL Recycling: The process of collecting mixed recyclable materials in one container on-site. The container is taken to a material recovery facility where materials are separated for recycling.
- G. Approved Recycling Facility: Any of the following:
 - 1. A facility that can legally accept CDL waste materials for the purpose of processing the materials into an altered form for the manufacture of a new product.
 - 2. Material Recovery Facility: A general term used to describe a waste-sorting facility. Mechanical, hand-separation, or a combination of both procedures, are used to recover recyclable materials.

1.3 SUBMITTALS

- A. Contractor shall develop a Waste Management Plan: Submit 3 copies of plan within 14 days of date established for the **Notice to Proceed**.
- B. Contractor shall provide Waste Management Report: Concurrent with each Application for Payment, submit **3** copies of report.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Divert a minimum of **75%** CDL waste, by weight, from the landfill by one, or a combination of the following activities:
1. Salvage
 2. Reuse
 3. Source-Separated CDL Recycling
 4. Co-mingled CDL Recycling
- B. CDL waste materials that can be salvaged, reused or recycled include, but are not limited to, the following:
1. Acoustical ceiling tiles
 2. Asphalt
 3. Asphalt shingles
 4. Cardboard packaging
 5. Carpet and carpet pad
 6. Concrete
 7. Drywall
 8. Fluorescent lights and ballasts
 9. Land clearing debris (vegetation, stumpage, dirt)
 10. Metals
 11. Paint (through hazardous waste outlets)
 12. Wood
 13. Plastic film (sheeting, shrink wrap, packaging)
 14. Window glass
 15. Wood
 16. Field office waste, including office paper, aluminum cans, glass, plastic, and office cardboard.

1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED Accredited Professional, certified by the USGBC as waste management coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Conduct construction waste management activities in accordance with hauling and disposal regulations of all authorities having jurisdiction and all other applicable laws and ordinances.
- D. Preconstruction Conference: Schedule and conduct meeting at Project site prior to construction activities.
1. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.

- a. Owner
 - b. Architect
 - c. Contractor's superintendent
 - d. Major subcontractors
 - e. Waste Management Coordinator
 - f. Other concerned parties.
2. Agenda Items: Review methods and procedures related to waste management including, but not limited to, the following:
- a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.
3. Minutes: Record discussion. Distribute meeting minutes to all participants.
Note: If there is a Project Architect, they will perform this role.
- 1.6 WASTE MANAGEMENT PLAN – Contractor shall develop and document the following:
- A. Develop a plan to meet the requirements listed in this section at a minimum. Plan shall consist of waste identification, waste reduction plan and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight throughout the plan.
 - B. Indicate anticipated types and quantities of demolition, site-cleaning and construction waste generated by the project. List all assumptions made for the quantities estimates.
 - C. List each type of waste and whether it will be salvaged, recycled, or disposed of in an landfill. The plan should included the following information:
 1. Types and estimated quantities, by weight, of CDL waste expected to be generated during demolition and construction.
 2. Proposed methods for CDL waste salvage, reuse, recycling and disposal during demolition including, but not limited to, one or more of the following:
 - a. Contracting with a deconstruction specialist to salvage materials generated,
 - b. Selective salvage as part of demolition contractor's work,
 - c. Reuse of materials on-site or sale or donation to a third party.
 3. Proposed methods for salvage, reuse, recycling and disposal during construction including, but not limited to, one or more of the following:
 - a. Requiring subcontractors to take their CDL waste to a recycling facility;

- b. Contracting with a recycling hauler to haul recyclable CDL waste to an approved recycling or material recovery facility;
 - c. Processing and reusing materials on-site;
 - d. Self-hauling to a recycling or material recovery facility.
4. Name of recycling or material recovery facility receiving the CDL wastes.
 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management).
 4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in hauling and tipping fees by donating materials.
 7. Savings in hauling and tipping fees that are avoided.
 8. Handling and transportation costs. Including cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT, GENERAL

- A. Provide containers for CDL waste that is to be recycled clearly labeled as such with a list of acceptable and unacceptable materials. The list of acceptable materials must be the same as the materials recycled at the receiving material recovery facility or recycling processor.
- B. The collection containers for recyclable CDL waste must contain no more than 10% non-recyclable material, by volume.
- C. Provide containers for CDL waste that is disposed in a landfill clearly labeled as such.
- D. Use detailed material estimates to reduce risk of unplanned and potentially wasteful cuts.
- E. To the greatest extent possible, include in material purchasing agreements a waste reduction provision requesting that materials and equipment be delivered in packaging made of recyclable material, that they reduce the amount of packaging, that packaging be taken back for reuse or recycling, and to take back all unused product. Insure that subcontractors require the same provisions in their purchase agreements.

- F. Conduct regular visual inspections of dumpsters and recycling bins to remove contaminants.

3.2 SOURCE SEPARATION

- A. General: Contractor shall separate recyclable materials from CDL waste to the maximum extent possible.

Separate recyclable materials by type.

1. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water and to minimize pest attraction. Cover to prevent windblown dust.
3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from weather.

3.3 CO-MINGLED RECYCLING

- A. General: Do not put CDL waste that will be disposed in a landfill into a co-mingled CDL waste recycling container.

REMOVAL OF CONSTRUCTION WASTE MATERIALS

- A. Remove CDL waste materials from project site on a regular basis. Do not allow CDL waste to accumulate on-site.
- B. Transport CDL waste materials off Owner's property and legally dispose of them.
- B. Burning of CDL waste is not permitted.

END OF SECTION 01 74 19

WASTE MANAGEMENT PROGRESS REPORT				
MATERIAL CATEGORY	DISPOSED IN MUNICIPAL SOLID WASTE LANDFILL	DIVERTED FROM LANDFILL BY RECYCLING, SALVAGE OR REUSE		
		Recycled	Salvaged	Reused
1. Acoustical Ceiling Tile				
2. Asphalt				
3. Asphalt Shingles				
4. Cardboard Packaging				
5. Carpet and Carpet Pad				
6. Concrete				
7. Drywall				
8. Fluorescent Lights and ballast				
9. Land Clearing Debris (vegetation, stumpage, dirt)				
10. Metals				
11. Paint (through hazardous waste outlets)				
12. Wood				
13. Plastic Film (sheeting, shrink wrap, packaging)				
14. Window Glass				
15. Field Office Waste (office paper, aluminum cans, glass, plastic, and coffee cardboard)				
16. Other (insert description)				
17. Other (insert description)				
Total (In Weight)		(TOTAL OF ALL ABOVE VALUES – IN WEIGHT)		
		Percentage of Waste Diverted	(TOTAL WASTE DIVIDED BY TOTAL DIVERTED)	

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. See Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 01 Section "Photographic Documentation" for submitting Final Completion construction photographs and negatives.
- D. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- E. See Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 8. Complete final cleaning requirements, including touchup painting.

9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."

2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. If more than one (1) reinspection is required all associated cost of that inspection including architect/engineering fees shall be the responsibility of the Contractor.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize items applying to each major element, including categories.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove labels that are not permanent.
 - h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - i. Remove excess mortar droppings, and other foreign substances.
 - j. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings (As-built Drawings).
 - 2. Record Specifications (As- built Specifications).
 - 3. Record Product Data As-built Product Data).
- B. See Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up Record Prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit one set of red marked as-built prints to the Architect. The Architect will approve via initials and date the prints and indicate whether general scope of changes, additional information recorded, and quality of mark-ups are acceptable as well as any other modifications are deemed necessary. If required by the Architect the Contractor shall, at no additional expense to the Owner or Architect, prepare a revised set of As-built Prints for submission and approval by the Architect. The Architect will return approved prints to the contractor to prepare additional required sets for final submittal.
 - b. Final Submittal: Submit one set of red marked As-built Prints to the Architect. As-built Prints must be identical to initial submission with required corrections.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 COMPLETE PROJECT RECORD DOCUMENTS

- A. Preparation: Provide one complete set of Project Record Documents to the Owner.

2.4 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.5 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 01 78 39

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner as indicated.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Predemolition Photographs or Video: Submit before Work begins.
- C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove personal items not indicated on the drawings
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 5. Dispose of demolished items and materials promptly.
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Store items in a secure area until delivery to Owner.
3. Transport items to Owner's storage area on-site.
4. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

- B. Burning: Do not burn demolished materials.

- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 04 01 20 - MAINTENANCE OF UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes maintenance of unit masonry consisting of brick clay masonry restoration and cleaning as follows:
1. Repairing unit masonry, including replacing units.
 2. Repointing joints.
 3. Preliminary cleaning, including removing plant growth.
 4. Cleaning exposed unit masonry surfaces.

1.2 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
- B. Medium-Pressure Spray: 400 to 800 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

1.4 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows.
1. Existing Brick: Test each type of existing masonry unit indicated for replacement, according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from Troop 6 Garage wall. Take testing samples from these units.
 2. Existing Mortar: Test according to ASTM C 295, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use X-ray diffraction, infrared spectroscopy, and differential thermal analysis as necessary to supplement microscopical methods. Carefully remove existing mortar from within joints at five locations designated by testing service.
 3. Temporary Patch: As directed by Architect, provide temporary materials at locations from which existing samples were taken.
 4. Replacement Brick: Test each proposed type of replacement masonry unit, according to sampling and testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Provisions for expansion joints or other sealant joints.
- C. Samples: For each exposed product and for each color and texture specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Preconstruction test reports.

1.7 QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.
 - 1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
 - 2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress.
 - 3. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.
- B. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.
 - 1. Provide units with physical properties, colors, color variation within units, surface texture, size, and shape to match existing brickwork.
 - a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Mortar Sand: ASTM C 144 unless otherwise indicated.
 - 1. Color: Provide natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - 2. For pointing mortar, provide sand with rounded edges.
 - 3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
- D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- E. Water: Potable.
 - a. <Insert manufacturer's name; product name or designation>.

2.3 ACCESSORY MATERIALS

- A. Setting Buttons: Resilient plastic buttons, nonstaining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.

2.4 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 - 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures in mortar unless otherwise indicated.

- D. Mortar Proportions: Mix mortar materials in the following proportions:
1. Pointing Mortar for Brick: 1 part portland cement, 2 parts lime, and 6 parts sand.
 - a. Add mortar pigments to produce mortar colors required.
 2. Rebuilding (Setting) Mortar: Same as pointing mortar.
 3. Rebuilding (Setting) Mortar: 1 part portland cement, 2 parts lime, and 6 parts sand.
 4. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

3.2 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Remove in an undamaged condition as many whole bricks as possible.
1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
- E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Replace removed damaged brick with other removed brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.
- G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
1. Maintain joint width for replacement units to match existing joints.
 2. Use setting buttons or shims to set units accurately spaced with uniform joints.

- H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.). Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
 3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.3 REPOINTING MASONRY

- A. Rake out and repoint joints to the following extent:
1. All joints in areas indicated.
 2. Joints where mortar is missing or where they contain holes.
 3. Cracked joints where cracks can be penetrated at least 1/4 inch (6 mm) by a knife blade 0.027 inch (0.7 mm) thick.
 4. Cracked joints where cracks are 1/16 inch (1.6 mm) or more in width and of any depth.
 5. Joints where they sound hollow when tapped by metal object.
 6. Joints where they are worn back 1/4 inch (6 mm) or more from surface.
 7. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
 8. Joints where they have been filled with substances other than mortar.
 9. Joints indicated as sealant-filled joints.
- B. Do not rake out and repoint joints where not required.
- C. Rake out joints as follows, according to procedures demonstrated in approved mockup:
1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2 inch (13 mm) or not less than that required to expose sound, unweathered mortar.
 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
 - a. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet.
- D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
 2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch (9 mm) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch (9 mm). Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
 4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
 5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
 - a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
- F. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.4 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
1. Do not use metal scrapers or brushes.
 2. Do not use acidic or alkaline cleaners.

END OF SECTION 04 01 20

SECTION 04 21 13 - BRICK MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Face brick.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type and color of brick and mortar.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product indicated.

1.4 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness.

1.5 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

- A. Regional Materials: Brick shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. General: Provide shapes indicated and as follows.
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).
 - 1. Products: Subject to compliance with requirements, provide brick that matches the existing brick in size, color, texture and pattern.
 - 2. Grade: SW.
 - 3. Type: FBS or FBX
 - 4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
 - 5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - 6. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color to match existing.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

- D. Aggregate for Mortar: ASTM C 144.
 - 1. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
 - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

2.4 REINFORCEMENT

- A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
- B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized, carbon-steel continuous wire.

2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.
- C. Adjustable Masonry-Veneer Anchors:
 - 1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
 - 2. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:

3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213.
 - 2) Heckmann Building Products Inc.; 315-D with 316.
 - 3) Hohmann & Barnard, Inc.; DW-10.
 - b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, having slotted holes for inserting wire tie.
 - c. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- (1.90-mm-) thick, steel sheet, galvanized after fabrication.
 - d. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.25-inch- (6.35-mm-) diameter, hot-dip galvanized steel wire.
4. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.
 - a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - 1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213S.
 - 2) Hohmann & Barnard, Inc.; DW-10-X-Seismiclip.
 - 3) Wire-Bond; RI-711 with Wire-Bond clip.
 - 4) <Insert manufacturer's name; product name or designation>.
 - b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, having slotted holes for inserting connector section.
 - c. Connector Section: Rib-stiffened, sheet metal bent plate, sheet metal clip, or wire tie and rigid PVC extrusion designed to engage continuous wire. Size connector to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
 - d. Fabricate sheet metal anchor sections and other sheet metal parts from [0.075-inch- (1.90-mm-) thick, steel sheet, galvanized after fabrication] [1.05-inch- (2.66-mm-) thick, steel sheet, galvanized after fabrication].
 - e. Fabricate wire connector sections from [0.187-inch- (4.76-mm-)] [0.25-inch- (6.35-mm-)] diameter, hot-dip galvanized, carbon-steel wire.
5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
6. Stainless-Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer.

2.6 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
 2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
 3. Stainless Steel: 26 gage (.018 inches thick).
 4. Fabricate through-wall metal flashing embedded in masonry from sheet metal indicated above.
 5. Fabricate metal expansion-joint strips from sheet metal indicated above, formed to shape indicated.
- B. Concealed Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use the following, unless otherwise indicated:
1. EPDM: Ethylene Propylene Diene Terpolymer synthetic rubber. Flexible 40 mil elastomeric rubber membrane.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.
- E. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following:
1. Pre-fabricated Metal Flashing:
 - a. Cheney Flashing; Cheney Flashing Company, Inc.
 - b. Keystone 3-Way Interlocking Thruwall Flashing; Keystone Flashing Co.
 - c. Sandell
 2. EPDM Flashing, flexible membrane:
 - a. Carlisle Pre-Kleened EPDM; Carlisle Coatings & Waterproofing, Incorporated.
- F. Firestone Flashgard Thru-Wall Flashing; Firestone Building Products Co.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Available Products: Subject to compliance with requirements, materials that may be incorporated into the Work include the following:

1. For substitution products, refer to Division 1 Section "Substitutions for Requirements."

- B. Compressible Expansion Material: Closed cell neoprene sponge with sensitive adhesive on one side ASTM D-1056 Grade 2A1.

Products: Provide the following:

1. Hohmann and Barnard, #NS
2. Dur-O-Wal, D/A 2015
3. Sandell Mfg. Co., Inc.

- C. Compressible Exterior Expansion Joint Filler: Silicone faced acrylic-impregnated expanding foam sealant and closed-cell foam sealant system. ASTM 1105, compressible up to 50 percent; of width and thickness indicated. Color as selected by Architect, from full range of standard and special colors.

Products: Provide the following:

1. Colorseal, Emseal Joint Systems, Ltd.

- D. Preformed Control-Joint Gaskets: Styrene-Butadiene-Rubber Compound designed to fit standard sash block and to maintain lateral stability in masonry wall. ASTM D 2000, Designation M2AA-805.

Products: Provide the following:

1. Hohmann and Barnard
2. Dur-O-Wal
3. Sandell Mfg. Co., Inc.

- E. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

- F. Weep Tubes: 3/8" O.D. polyethylene by 4-inch long. Provide with integral cotton wick attached and stainless steel screen insert. Weep tubes to be installed at masonry opening (i.e. window sill flashing conditions only).

Products: Provide the following:

1. Hohmann and Barnard, #341 W/S.

- G. Cavity Drainage Material: Free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings, thickness to match cavity air space.

Products: Provide the following:

1. Mortar Net ; Mortar Net USA, Ltd.

- H. Cavity Weep: Free-draining mesh; made from polyester mesh. Color as selected by Architect, from full range of standard and special colors.

Products: Provide the following:

1. Mortar Net Weep Vents, Mortar Net USA, Ltd.

- a. Height of weep shall match the height of the specified masonry veneer (up to 4" nominal) as indicated in Products. Use the 4" nominal height weep at 8" or higher masonry veneer units.
- b. Color as selected to match associated mortar.

- I. Cavity Vent: Free-draining mesh; made from polyester mesh. Color as selected by Architect, from full range of standard and special colors.

Products: Provide the following:

1. Mortar Net Weep Vents, Mortar Net USA, Ltd.

- a. Height of weep shall match the height of the specified masonry veneer (up to 4" nominal) as indicated in Products. Use the 4" nominal height weep at 8" or higher masonry veneer units.
- b. Color as selected by Architect to match associated mortar.

- J. Cavity Vapor Retarder (Installed over Gypsum Sheathing): spun-bonded weather-resistant barrier which permits moisture vapor to escape through the barrier while remaining resistant to water penetration ASTM D-882, ASTM E-96, ASTM D-882, AATCC 127.

Products: Provide the following:

- 1. Tyvek Commercial Wrap, Dupont
- 2. WallShield, A. Proctor Group

2.8 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Follow brick manufacturer's recommendations for cleaning solution for each brick type.

1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:

- a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching:

1) 202 New Masonry Detergent; Diedrich Technologies, Inc.

- 2) Sure Klean No. 600 Detergent; ProSoCo, Inc.
- b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining:
 - 1) 200 Lime Solv; Diedrich Technologies, Inc.
 - 2) Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
- c. Cleaners for Brick Subject to Metallic Staining:
 - 1) 202V Vana-Stop; Diedrich Technologies, Inc.
- d. Sure Klean Vana Trol; ProSoCo, Inc.

2.9 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Mix to match existing mortar.
 - 2. Application: Use colored aggregate mortar for exposed mortar joints.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm); do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints to match existing "grape-vine" joint when thumbprint hard, using a jointer of size and profile as required unless otherwise indicated.

3.5 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 4. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.6 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal

- penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
1. Use specified weep/vent products or open head joints to form weep holes.
 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.7 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780

3.8 CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes
 2. Protect adjacent surfaces from contact with cleaner.
 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

4. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."

3.9 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 21 13

CANNOT BE USED FOR BIDDING.

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring.
4. Wood sleepers.
5. Plywood backing panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. [**Do not use inorganic boron (SBX) for sill plates.**]
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Roof framing and blocking.
4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
5. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.
- B. Other Framing: Construction or No. 2 grade and any of the following species:
 1. Hem-fir (north); NLGA.
 2. Southern pine; SPIB.
 3. Douglas fir-larch; WCLIB or WWPA.
 4. Mixed southern pine; SPIB.
 5. Spruce-pine-fir; NLGA.
 6. Douglas fir-south; WWPA.
 7. Hem-fir; WCLIB or WWPA.
 8. Douglas fir-larch (north); NLGA.
 9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
 7. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 1. Mixed southern pine, No. 2 grade; SPIB.
 2. Eastern softwoods, No. 2 Common grade; NELMA.
 3. Northern species, No. 2 Common grade; NLGA.
 4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.6 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.
 - 1. Plywood shall be fire rated and comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.
- C. Screws for Fastening to Metal Framing: ASTM C 1002 ASTM C 954, length as recommended by screw manufacturer for material being fastened.

2.8 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Do not splice structural members between supports unless otherwise indicated.

- F. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

CANNOT BE USED FOR BIDDING

SECTION 07 18 00 - TRAFFIC COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes traffic coatings for the following applications:

1. Pedestrian traffic.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including installation instructions.

- B. Shop Drawings: For traffic coatings.

1. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.

- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.

- B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace traffic coating that fails in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Material Compatibility: Provide primers; base-, intermediate-, and topcoat; and accessory materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.2 TRAFFIC COATING

- A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, waterproofing membrane system with integral wearing surface for pedestrian traffic; according to ASTM C 957.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide COTE-L Industries, Inc.; DURABAK 18 or comparable product by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. Pecora Corporation.
 - c. Urethane Polymers International, Inc.
- B. Primer: Liquid primer recommended for substrate and conditions by traffic-coating manufacturer.
- C. Preparatory and Base Coats: Polyurethane or [epoxy.
- D. Intermediate Coat: Polyurethane or epoxy.
1. Aggregate Content: As recommended in writing by traffic-coating manufacturer for substrate and service conditions indicated.
- E. Topcoat: Polyurethane.
1. Aggregate Content: As recommended in writing by traffic-coating manufacturer for substrate and service conditions indicated.
 2. Color: As selected by Architect from manufacturer's full range.
- F. Aggregate: Manufacturer's standard aggregate for each use indicated of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.

- G. VOC Content: Traffic coating shall have a VOC content of 150 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Low-Emitting Materials: Traffic coating shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 ACCESSORY MATERIALS

- A. Joint Sealants: ASTM C 920.
- B. Sheet Flashing: Nonstaining sheet material recommended in writing by traffic-coating manufacturer.
- C. Adhesive: Contact adhesive recommended in writing by traffic-coating manufacturer.
- D. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic-coating manufacturer.

2.4 PAVEMENT MARKINGS (Delaware State Police Logo)

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than three minutes.
 - 1. Color: To include three colors as selected by Architect from Manufacturer's standard available colors.
- B. VOC Content: Pavement-marking paints shall have a VOC content of 150 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Low-Emitting Materials: Pavement-marking paints shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Clean and prepare substrates according to ASTM C 1127 and manufacturer's written instructions to produce clean, dust-free, dry substrate for traffic-coating application.
 - 1. Application of coating indicates acceptance of surfaces and conditions.
- B. Mask adjoining surfaces not receiving traffic coatings to prevent overspray, spillage, leaking, and migration of coatings. Prevent traffic-coating materials from entering deck substrate penetrations and clogging weep holes and drains.

- C. Concrete Substrates: Mechanically abrade surface to a uniform profile acceptable to manufacturer, according to ASTM D 4259. Do not acid etch.
 - 1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
 - 2. Remove concrete fins, ridges, and other projections.
 - 3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
 - 4. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D 4258.

3.2 TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's written instructions.
- B. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.
- C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
- D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

3.3 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C 1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Comply with recommendations in ASTM C 1193 for joint-sealant installation.
- B. Apply reinforcing strip in traffic-coating system where recommended in writing by traffic-coating manufacturer.

3.4 TRAFFIC-COATING APPLICATION

- A. Apply traffic coating according to ASTM C 1127 and manufacturer's written instructions.
- B. Apply number of coats of specified compositions for each type of traffic coating at locations as indicated on Drawings.
- C. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated; omit aggregate on vertical surfaces.
- D. Cure traffic coatings.

3.5 PAVEMENT MARKINGS

- A. Do not apply pavement-marking paint for Delaware State Police logo until layout, colors, and placement have been verified with Architect and traffic coating has cured.
- B. Sweep and clean surface to eliminate loose material and dust.
- C. Apply pavement-marking paint with mechanical equipment to produce markings of dimensions indicated with uniform straight edges. Apply at manufacturer's recommended rates for a 15-mil- (0.4-mm-) minimum, wet film thickness.

3.6 PROTECTING AND CLEANING

- A. Protect traffic coatings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 18 00

CANNOT BE USED FOR BIDDING.

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Concealed building insulation.
 2. Vapor retarders.
 3. Sound attenuation insulation.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product test reports.
- D. Research/Evaluation Reports: For foam-plastic insulation.

1.3 QUALITY ASSURANCE

- A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
1. CertainTeed Corporation.
 2. Guardian Fiberglass, Inc.
 3. Johns Manville.
 4. Knauf Fiber Glass.
 5. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- C. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene polypropylene-scrim-kraft vapor-retarder membrane on 1 face.
- D. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:

2.3 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- D. Single-Component Non-sag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and with demonstrated capability to bond vapor retarders securely to substrates indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
 - 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
 - 6. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.

- b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- E. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.3 INSTALLATION OF INSULATION FOR SOUND ATTENUATION

- A. Install unfaced glass-fiber blanket insulation in all interior framed partitions for sound control.

3.4 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Under all interior slabs or as indicated.
- B. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- C. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 07 21 00

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Repair of existing EPDM roofing systems

1.2 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Roofing Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EPDM ROOFING

- A. EPDM: ASTM D 4637, uniform, flexible EPDM sheet.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. GAF Materials Corporation.
 - d. Johns Manville.
 - 2. Thickness: match existing.
 - 3. Exposed Face Color: Match existing .

2.2 AUXILIARY ROOFING MATERIALS

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

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

- A. Field verify all existing conditions in regard to required patching and repair. Report any discrepancies to the architect prior to beginning work.
- B. Patch roofing system according to roofing system manufacturer's written instructions.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Install roofing and auxiliary materials to tie in to existing roofing to maintain weather tightness of transition.

3.2 BASE FLASHING INSTALLATION

- A. Install new flashing as indicated on the drawings or as may be required to repair the existing roof as indicated..
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings.

3.3 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075323

CANNOT BE USED FOR BIDDING.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference:** Conduct conference at Project site.

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings:** For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

- C. Samples:** For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.**

- B. Product test reports.**

- C. Sample warranty.**

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.**

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical Garage wall top flashing, approximately 5 feet (1.5 m) long.

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Exposed Coil-Coated Finish:

- a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

- a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
- b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
- c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

- E. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Obtain field measurements for accurate fit before shop fabrication.
 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

2.6 WALL SHEET METAL FABRICATIONS

- A. Wall Fascia and Flashing: Fabricate continuous fascias and flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate from the following materials:
1. Aluminum 0.050 inch (1.27 mm) thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

- A. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Fascia and Wall Top Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07 62 00

SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.

1.2 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-60. Identify materials with FM Approvals' markings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2.2 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).

- C. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
- D. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet (3.6 m), concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide Hickman Company, W.P.; Permasnap Wall Coping or comparable product by one of the following:
 - a. ATAS International, Inc.
 - b. Cheney Flashing Company.
 - c. Hickman Company, W. P.
 - d. Johns Manville.
 - e. Merchant & Evans, Inc.

3. Coping-Cap Material: Formed aluminum, thickness as required to meet performance requirements.
 - a. Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 4. Torch cutting of roof specialties is not permitted.
 5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment. Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.2 COPING INSTALLATION

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings to meet performance requirements.
 - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.3 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 07 71 00

CANNOT BE USED FOR BIDDING.

**SECTION 07 84 13
HVAC & PLUMBING PENETRATION FIRESTOPPING
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SECTION 078413 HVAC & PLUMBING PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section includes:
 - 1. Through-penetration firestopping in fire rated construction.
 - 2. Through-penetration smoke-stopping in smoke partitions.
- C. Related items:
 - 1. Fire dampers and manufactured devices: Refer to Division 23 Section *HVAC Air Distribution*.

1.2 REFERENCES

- A. Underwriters Laboratories
 - 1. UL Fire Resistance Directory
 - a. Through-penetration firestop devices (XHCR)
 - b. Fire resistance rating (BXUV)
 - c. Through-penetration firestop systems (XHEZ)
 - d. Fill, void, or cavity material (XHHW)
- B. American Society for Testing and Materials Standards:
 - 1. ASTM E 814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

1.3 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time-rated fire walls, smoke barrier walls, time-rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural

floor such that full thickness of rated materials is not obtained.

- E. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
- F. Sleeve: Metal fabrication or pipe section extended through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.4 SYSTEM DESCRIPTION

A. Design Requirements

- 1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations.
- 2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations.

1.5 SUBMITTALS

- A. Submit in accordance with Division 01 Section *Submittal Procedures*, unless otherwise indicated.
- B. Product data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specification of construction and fabrication.
 - 2. Manufacturer's installation instructions.
- C. Shop drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
 - 1. Details of each proposed assembly identifying intended products and applicable UL system number, or UL classified devices.
 - 2. Manufacturer or manufacturer's representative shall provide qualified engineering judgment and drawings relating to non-standard applications as needed.
- D. Quality control submittals:
 - 1. Statement of qualifications.
- E. Applicators' qualifications statement:
 - 1. List past projects indicating required experience.

1.6 QUALITY ASSURANCE

- A. Installer's qualifications: Fire experienced in installation or application of systems similar in complexity to those required for this project, plus the following:
 - 1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
 - 2. At least 2 years experience with systems.
 - 3. Successfully completed at least 5 comparable scale projects using this system.
- B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping:
 - 1. Deliver products in original unopened packaging with legible manufacturer's identification.
 - 2. Coordinate delivery with scheduled installation date, allow minimum storage at site.
- B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.8 PROJECT CONDITIONS

- A. Existing condition:
 - 1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
 - 2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.
- B. Environmental requirements:
 - 1. Furnish adequate ventilation if using solvent.
 - 2. Furnish forced air ventilation during installation if required by manufacturer.
 - 3. Keep flammable materials away from sparks or flame.
 - 4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

1.9 WARRANTY

- A. Submit copies of written warranty agreeing to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The warranty period shall be two (2) years from date of substantial completion unless otherwise noted.

PART 2 PRODUCTS

2.1 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Systems of devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.
 - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.
 - 2. Acceptable manufacturers and products.
 - a. Those listed in the UL Fire Resistance directory for the UL System involved and as further defined in the System and Applications Schedule in Part 3.6 of this section.
 - 3. All firestopping products must be from a single manufacturer. All trades shall use products from the same manufacturer unless otherwise noted.

2.2 SMOKE-STOPPING AT SMOKE PARTITIONS

- A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration firestopping in fire-rated construction, as specified in The Systems and Applications Schedule in Part 3.6 of this section, is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.3 ACCESSORIES

- A. Fill, void or cavity materials: As classified under category XHHW in the UL Fire Resistance Directory.
- B. Forming materials: As classified under category XHKU in the UL Fire Resistance Directory.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.
- B. Coordinate an inspection of all Mechanical Firestopping systems with the Fire Marshal prior to installation of ceilings, walls, etc.

3.2 PREPARATION

- A. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting, adhesion, or the required fire resistance.

3.3 INSTALLATION

- A. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer's instruction.
- B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.
- C. Protect materials from damage on surfaces subject to traffic.
- D. When large openings are created in walls or floors to permit installation of pipes, ducts, or other items, close unused portions of opening with firestopping materials tested for the application. See UL Fire Resistance Directory or Section 3.6 of this document.
- E. Install smoke stopping as specified for firestopping.

3.4 FIELD QUALITY CONTROL

- A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.5 ADJUSTING AND CLEANING

- A. Clean up spills of liquid components.
- B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

3.6 SYSTEMS AND APPLICATION SCHEDULES*

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**DELAWARE STATE POLICE TROOPS 1 & 6 -
RENOVATIONS**

**DA LLC NO. 012-014
STATE NO. MC4506000035**

PENETRATING ITEM	CONCRETE	GYPSUM	WOOD FLOOR/CEILING
Metal Pipe	CAJ1001 CP25S/L, CP25N/S CAJ1006 CS-195+, FS-195+ CAJ1007 FS-195+, 1-inch& 2-inch Wide CAJ1009 2000, 2000+, 2003 CAJ1010 2000, 2000+, 2003 CAJ1012 2000, 2000+, 2003 CAJ1013 2000, 2000+, 2003 CAJ1014 2000, 2000+, 2003 CAJ1015 2000, 2000+, 2003 CAJ1017 FD 150 CAJ1021 FD 150 CAJ1027 MPS-2+ CAJ1044 CP 25WB+ CAJ1052 CP 25S/L, CP 25N/S CAJ1058 2000, 2000+, 2003 CAJ1060 2000, 2000+, 2003 CAJ1063 2000, 2000+, 2003 CAJ1066 CP 25N/S, CP 25S/L, CP 25WB+ CAJ1091 CP 25N/S, CP 25S/L, CP 25WB+ CAJ1092 CP 25WB+ CAJ1112 FS-195+ CAJ1160 CP 25S/L, CP 25N/S CAJ1175 CP 25WB+ CAJ1176 CP 25WB+ CAJ1188 2000+ CBJ1020 CS-195+, FS-195+ CBJ1021 CS-195+, MPS-2+ CBJ1031 2001 CBJ1032 2001 FA1002 CP 25WB+ WJ1010 CP25WB+ WJ1023 2001	WL1001 CP 25 WL1002 FS-195+ WL1003 CP 25WB+, CP 25N/S WL1008 2000+ WL1009 2000+ WL1010 2000+ WL1016 CP 25WB+ WL1017 CP 25WB+, CP 25N/S WL1032 CP 25WB+, CP 25N/S WL1036 FD 150 WL1037 CS-195+, FS-195+ WL1067 CP 25N/S WL1073 CP 25WB+ WL1080 MPS2+ WL1082 2000+	FC1002 CP 25 FC1003 2000, 2000+, 20003 FC1006 CP 25WB+
Non-Metallic	CAJ2001 FS-195+, 1-inch& 2-inch WIDE, PPD'S CAJ2002 FS-195+ CAJ2003 CS-195+, FS-195+ CAJ2005 FS-195 CAJ2006 FS-195+ CAJ2013 FS-195+ CAJ2019 2000, 2000+, 2003 CAJ2027 FS-195+, CP 25N/S, CP 25S/L, CP 25WB+ CAJ2028 FS-195, MPS-2+ CAJ2029 FS-195+, PPD'S CAJ2030 CS-195+, FS-195+ CAJ2040 FS-195+, CP 25WB+ CAJ2044 FS-195+, CP 25N/S, CP 25S/L CP 25 WB+ CAJ2090 FS-195+ CAJ2177 FS-195+, PPD'S FA2001 FS-195+, PPD'S FS2002 CS-195+, FS-195+, MPS-2+, PPD'S FA2011 FS-195+ WJ2012 FS-195+ 1-inch WIDE	WL2002 FS-195+, PPD'S WL2003 FS-195+ WL2004 FS-195+ WL2005 FS-195+ 4' WIDE WL2006 FS-195+ WL2013 FS-195+ WL2031 CS-195+, FS-195+ WL2032 CS-195+, FS-195+ WL2033 FS-195+ WL2073 FS-195+ 1-inch WIDE	FC2002 FS-195+, PPD'S FC2007 FS-195+, PPD'S FC2008 FS-195+ FC2009 FS-195+, PPD'S FC2024 FS-195 FC2026 FS-195+ FC2028 FS-195, 1' & 2-inch WIDE, PPD'S

**DELAWARE STATE POLICE TROOPS 1 & 6 -
RENOVATIONS**

**DA LLC NO. 012-014
STATE NO. MC4506000035**

PENETRATING ITEM	CONCRETE	GYPSUM	WOOD FLOOR/CEILING
Insulated Metallic Pipe	CAJ5001 CP 25N/S, CP 25S/L, CP 25WB+ CAJ5002 FS-195+ CAJ5003 FS-195+ CAJ5005 MPS-2+ CAJ5009 2000+, 2003 CAJ5017 FS-195+, CP 25 CAJ5022 FS-195+ CAJ5024 FS-195+ CAJ5030 CS-195+, FS-195+ CAJ5041 2000, 2000+, 2003 CAJ5060 CP 25WB+ CAJ5074 2000+ CBJ5002 CP 25 CBJ5003 FS-195+ FA5001 FS-195+, CP 25WB+	WL5001 FS-195+ WL5002 FS-195+ WL5009 FS-195+ WL5010 FS-195+ WL5011 CP 25WB+ WL5032 2000+ WL5038 CP 25WB+ WL5039 CP 25WB+ WL5040 CP 25WB+ WL5045 CP 25WB+ WL5053 2000+	FC5002 FS-195+ FC5008 FS-195+
Miscellaneous Mechanical HVAC Ducts	CAJ7001 CP 25N/S CP 25S/L CAJ7003 CP 25WB+ CAJ7009 DUCT WRAP, BULK PUTTY		FC7001 CP 25S/L, CP 25N/S
Mixed Penetrating Items Combos	CAJ8001 CS-195+ FS-195 CAJ8003 2000, 2000+, 20003 CAJ8004 2000, 2000+, 20003 CAJ8006 2001 CAJ8013 FS-195+, CP 25 CBJ8004 CS-195, FS-195+ CBJ8005 CS-195+, MPS-2+ CBJ8008 2001 FA8001 FS-195+, CP 25WB+	WL8002 CS-195+, FS-195+	

* Underwriter's Laboratories, Inc., Fire Resistance Directory.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following applications:
 - 1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 2. Exterior joints in horizontal traffic surfaces.
 - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 4. Interior joints in horizontal traffic surfaces.
- B. See Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.
- C. See Division 08 Section "Glazing" for glazing sealants.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Preconstruction field test reports.
- D. Compatibility and adhesion test reports.
- E. Product certificates.

1.4 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:
1. Products:
 - a. Pecora Corporation
 - b. Tremco; Dow Corning
 - c. Sonneborn
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 25.
 4. Use Related to Exposure: NT (nontraffic).
- F. Multicomponent Nonsag Urethane Sealant:
1. Products:
 - a. Pecora Corporation.
 - b. Tremco.
 - c. Polymeric Systems Inc
 - d. Sonneborn
 2. Type and Grade: M (multicomponent) and NS (nonsag).
 3. Class: 50.
 4. Uses Related to Exposure: NT (nontraffic) andT (traffic).

2.4 LATEX JOINT SEALANTS

- A. Latex Sealant: Comply with ASTM C 834, Type O P, Grade NF.
- B. Products:
1. Bostik Findley; Chem-Calk 600.
 2. Pecora Corporation; AC-20+.
 3. Schnee-Morehead, Inc.; SM 8200.
 4. Sonneborn, Division of ChemRex Inc.; Sonolac.
 5. Tremco; Tremflex 834.

2.5 PREFORMED JOINT SEALANTS

- A. Preformed Silicone-Sealant System: Manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
1. Products:
 - a. Dow Corning Corporation; 123 Silicone Seal.
 - b. GE Silicones; UltraSpan US1100.
 - c. Pecora Corporation; Sil-Span.
 - d. Tremco; Spectrem Ez Seal.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
 - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

2. Remove laitance and form-release agents from concrete.
 - a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- I. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 07 92 00

CANNOT BE USED FOR BIDDING.

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hollow-metal work.

1.2 DEFINITIONS

- A. **Minimum Thickness:** Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

- A. **Product Data:** For each type of product.
- B. **Shop Drawings:** Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. **Samples for Initial Selection:** For units with factory-applied color finishes.
- D. **Samples for Verification:** For each type of exposed finish required.
- E. **Schedule:** Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Amweld International, LLC.
 2. Ceco Door Products; an Assa Abloy Group company.
 3. Republic Doors and Frames.
 4. Rocky Mountain Metals, Inc.
 5. Steelcraft; an Ingersoll-Rand company.

2.2 INTERIOR DOORS AND FRAMES

- A. Standard-Duty Doors and Frames: SDI A250.8, Level 1.
1. Physical Performance: Level C according to SDI A250.4.
 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.032 inch (0.8 mm).
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard.
 3. Frames:
 - a. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
 - b. Construction: Full profile welded.
 4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- E. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- G. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.
- H. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).
- J. Glazing: Section 088000 "Glazing."
- K. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.7 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Install door silencers in frames before grouting.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.

4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

- a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
- b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
- c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
- d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid core doors with wood veneer faces.
2. Field Finishing (see finishes specifications)
3. Factory fitting wood doors to frames and factory machining for hardware.
4. Louvers installed in flush wood doors.
5. Light frames and glazing installed in flush wood doors.

B. Related Sections:

1. Division 01 Section "Sustainable Design Requirements" for additional LEED documentation and requirements.
2. Division 08 Section "Hollow Metal Doors and Frames" for wood doors in steel frames.
3. Division 08 Section "Glazing" for glass view panels in wood doors.
4. Division 08 Section "Door Hardware" for door hardware for flush wood doors.
5. Division 09 Section "Finishes" for wood doors.

C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A208.1 - Particleboard.
2. ASTM E90-90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
3. ASTM E 413 - Classification for Rating Sound Insulation.
4. Intertek Testing Service (ITS Warnock Hersey) - Certification Listings for Fire Doors.
5. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
6. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
7. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.
8. United States Green Building Council (USGBC).
9. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A or AWS classifications.

- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the wood door supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate fire protection ratings for fire rated doors.
- D. Informational Submittals:
 - 1. LEED Documentation: Submit manufacturer's environmental documentation and applicable sustainability program credits that are available to contribute towards a LEED rated project certification.
- E. Warranty: Sample of special warranties.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors."
- C. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C (neutral pressure testing according to UL 10B where specified).
 - 1. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide manufacturer's construction label, indicating compliance to independent 3rd party certification agency's procedure, except for size.
 - 2. Temperature Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire test exposure.
 - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - 1) Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
 - 4. Blocking: When through-bolts are not to be used, indicate size and location of blocking in 45, 60 and 90 minute mineral core doors
- D. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing flush wood doors.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.
 - c. Telegraphing of core construction and delamination of face in decorative laminate-faced doors.
 - 2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid Core Interior Doors: Life of installation according to manufacturer's written warranty.

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION - GENERAL

- A. WDMA I.S.1-A Performance Grade: Heavy Duty; Aesthetic Grade: Custom.
- B. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).
 - b. Screw Withdrawal, Edge: 400 lbf (1780 N).s.
- C. Environmentally Responsible Doors: Provide where specified doors manufactured with the following environmentally responsible components:
 - 1. Particleboard Core:

- a. Low Emitting Materials: Interior wood flush doors must contain no added urea-formaldehyde resins.

2.2 DOORS FOR OPAQUE FINISH

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Algoma Hardwoods, Inc.
 2. Eggers Industries.
 3. Mohawk Doors; a Masonite company.
 4. Oshkosh Door Company.
 5. VT Industries, Inc.

- B. Interior Solid Core Doors:
 1. Grade: Custom.
 2. Faces: Any closed-grain hardwood of mill option
 3. Core: Either glued wood stave or structural composite lumber.
 4. Construction: Five plies. Stiles and rails are bonded to core, then entire unit sanded before applying face veneers.

2.3 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with requirements in NFPA 80 for fire rated doors.

- B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.

- C. Openings: Cut and trim openings through doors in factory.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Field Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
 3. Louvers: Factory install louvers in prepared openings.

- D. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

2.4 FINISHING

- A. General: Comply with referenced quality standard for field finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.
- C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes fixed and operable aluminum-framed windows for exterior locations.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum windows and for sealants to the extent not specified in this Section.
 - 2. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.3 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. AW: Architectural.
 - 2. HC: Heavy Commercial.
 - 3. C: Commercial.
 - 4. LC: Light Commercial.
 - 5. R: Residential.
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.
- C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
- D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:
1. Size required by AAMA/WDMA 101/I.S.2/NAFS.
- B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 2. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.
- C. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.
- D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): [120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
1. Mullion details, including reinforcement and stiffeners.
 2. Joinery details.
 3. Expansion provisions.
 4. Flashing and drainage details.

5. Weather-stripping details.
 6. Thermal-break details.
 7. Glazing details.
 8. Window System Operators: Show locations, mounting, and details for installing operator components and controls.
 9. Window System Operators: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 10. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of aluminum windows and used to determine the following:
 - a. Structural test pressures and design pressures from wind loads indicated.
 - b. Deflection limitations of glass framing systems.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
1. Include similar Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For aluminum windows and components required, prepared on Samples of size indicated below.
1. Main Framing Member: 12-inch- (300-mm-) long, full-size sections of extrusions with factory-applied color finish.
 2. Window Corner Fabrication: 12-by-12-inch- (300-by-300-mm-) long, full-size window corner including full-size sections of extrusions with factory-applied color finish, weather stripping, and glazing.
 3. Operable Window: Full-size unit with factory-applied finish.
 4. Hardware: Full-size units with factory-applied finishes.
 5. Weather Stripping: 12-inch- (300-mm-) long sections.
- E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- F. Qualification Data: For Installer, manufacturer, professional engineer, and testing agency.
- G. Field quality-control test reports.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.
- I. Maintenance Data: For operable window sash, operating hardware, weather stripping, window system operators, and finishes to include in maintenance manuals.
- J. Warranty: Special warranty specified in this Section.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of data for aluminum windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for aluminum windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- F. Fenestration Standard: Comply with AAMA/WDMA 101/LS.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication.
- G. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup for type(s) of window(s) indicated, in location(s) shown on Drawings.
- I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to aluminum windows including, but not limited to, the following:
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for structural anchorage, glazing, flashing, weeping, sealants, and protection of finishes.

4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
 - e. Failure of insulating glass.
 2. Warranty Period:
 - a. Window: Three years from date of Substantial Completion.
 - b. Glazing: 10 years from date of Substantial Completion.
 - c. Metal Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide EFCO series 510 fixed and projecting windows or a comparable product by one of the following:
 1. Kawnee Company, Inc.; Alcoa Company
 2. TRACO
 3. YKK AP America Inc.

2.2 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.062-inch (1.6-mm) thickness at any location for the main frame and sash members.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
 - 1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOW

- A. Window Type: As indicated on Drawings.
- B. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.
 - 1. Performance Class and Grade: F-AW70.
- C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of not less than 53.
- D. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.
 - 1. U-Factor: 0.59 Btu/sq. ft. x h x deg F or less.

- E. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
1. Maximum Rate: 0.6 cfm/sq. ft. of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa).
- F. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
1. Test Pressure: 15 percent of positive design pressure, but not less than 2.86 lbf/sq. ft. (140 Pa) or more than 15 lbf/sq. ft. (720 Pa).
 2. Test Pressure: 20 percent of positive design pressure, but not more than 15 lbf/sq. ft. (720 Pa).
- G. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.
- H. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.
- I. Hardware, General: Manufacturer's standard corrosion-resistant hardware sized to accommodate sash weight and dimensions.
1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- J. Projected Window Hardware:
1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E 405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
 - a. Type and Style: As selected by Architect from manufacturer's full range of types and styles.
 2. Hinges: Non-friction type, not less than two per sash.
 3. Lock: Lever handle and cam-action lock with keeper.
 4. Limit Devices: Limit clear opening to 6 inches (150 mm) for ventilation; with custodial key release.

K.

2.4 GLAZING

- A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
 - 1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
 - 2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
 - 3. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.
- D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.
 - 1. Vertically Pivoted Windows: Provide double-row weather stripping.
- E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- F. Provide water-shed members above side hinged ventilators and similar lines of natural water penetration.
- G. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- H. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.
- I. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.
- J. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.6 FINISHES, GENERAL

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

2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color: As selected by Architect from Manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- F. Connect automatic operators to building electrical system.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method A or B, by applying same test pressures required to determine compliance with AAMA/WDMA 101/I.S.2/NAFS in Part 1 "Performance Requirements" Article.
 - 2. Testing Extent: One window as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
 - 3. Test Reports: Shall be prepared according to AAMA 502.
- C. Remove and replace noncomplying aluminum window and retest as specified above.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 08 51 13

CANNOT BE USED FOR BIDDING.

SECTION 08 71 00 - DOOR HARDWARE

1.1 GENERAL:

- A. Submit final hardware schedule organized by "hardware sets," to indicate specifically the product to be furnished for each item required on each door.
 - 1. Furnish templates to each fabricator of doors and frames as required for hardware preparation.
 - 2. Door manufactures requiring hardware before manufacturing may upon request, receive one of each item for preps. Items are to be used in final installation at jobsite.

1.2 PRODUCTS:

- A. Manufacturers: Subject to compliance with requirements, provide products by manufacturers for various products listed below. An asterisk (*) following manufacturer's name designates manufacturer whose products are indicated in Hardware Schedule. Such products are listed in the schedule by specific reference to manufacturer's catalog numbers. Except as otherwise indicated, products of equivalent quality, design, and function by other listed manufacturers may be used, subject to approval of Architect.
 - 1. Butts and Hinges: Hager, McKinney*, PBB.
 - 2. Locks and Latches: Corbin-Russwin*, Sargent, Yale.
 - 3. Cylinders: Corbin-Russwin*, Sargent, Yale.
 - 4. Overhead Closers: Corbin-Russwin, Norton*, Sargent, Yale.
 - 5. Door Stripping and Seals: DHSI*, Pemko*
- B. Finish and base material designations are indicated in accordance with ANSI BHMA A156.18 or the nearest traditional U.S. commercial finishes.
- C. Hinges and Pivots: Provide full-mortise butt, size, weight, and quantity in accordance with requirements established for door size, weight, and frequency of use.
 - 1. Pins: Stainless steel, except steel pins with steel hinges; non-removable for exterior and public interior exposure; non-rising for non security exposure; flat button with matching plugs.
 - 2. Ball-Bearing: Swaged, inner leaf beveled, square corners.
- D. Locks, Latches, and Bolts:
 - 1. Strikes: Wrought box strikes with extended lip for latch bolts, except open strike plates may be used in wood frames. Provide dust-proof strikes for flush bolts.
- E. Locks: Equip locks and cylinders with 6-pin removable core as listed in schedule. Provide temporary constructions cores as required at no cost to owner. New factory master key system.

1. Mortise: ANSI A156.13, Series 1000, Grade 1 locksets with latch bolt, lever handles and UL listed and labeled.
 2. Locksets & Latchsets shall carry 10 year warranty.
 3. Corbin-Russwin = ML2000 x PSA lever
Sargent = 8200 x P lever
Yale = 8800 x PB lever
- F. Overhead Closers: Where parallel-arm closers are indicated, provide units one size larger than recommended for standard-arm units. Comply with ADA standards A117.1-2003.
1. Closer shall carry 10 limited year warranty for defects and life of building on the aluminum body.
- G. Holders, Stops, and Bumpers: Provide gray rubber exposed resilient parts.
1. Finish exposed metal to match hardware, except finish floor plates to match finish of thresholds.
 2. Size and mount units indicated or, if not indicated, to comply with manufacturer's recommendations for the exposure condition. Reinforce the substrate as recommended.

1.3 EXECUTION:

- A. Hardware Mounting Locations: As recommended by the Door and Hardware Institute, unless indicated otherwise.
- B. Install each hardware item to comply with manufacturer's instructions and recommendations.
- C. Hardware Adjustment: Installer to return to project six months after Owner's occupancy, and adjust hardware to proper operation and function. Instruct Owner's personnel in proper maintenance and adjustment.
- D. Hardware Schedule: Provide hardware for each door as in the following list of hardware sets:

Hardware Set # 1 (Door: xyz)

Single Door

Each to have:

<u>Qty.</u>	<u>Type</u>	<u>Description</u>	<u>Finish</u>
3 ea.	Hinge	T4A3786 4-1/2" x 4-1/2"	652
1 ea.	Mortise Latchset	ML2030 PSA (privacy)F19	626
1 ea.	Closer	7500	689
1 ea.	Wall Stop	402	626
3 ea.	Gasket	CNS #105	

END OF SECTION 08710

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes glazing for the following products and applications (including those specified in other Sections where glazing requirements are specified by reference to this Section):
 - 1. Windows.
- B. Related Sections:
 - 1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 - 2. Division 8 Section "Aluminum Windows" for aluminum operable windows.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: 90 mph, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
 - b. Specified Design Snow Loads: 25, but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."
 - c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - d. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
 - 1) For insulating glass.
 - e. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 2. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.6 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of ; 12 inches (300 mm) square.
 - 1. Tinted glass.
 - 2. Coated glass.
 - 3. Insulating glass.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For installers.
- F. Product Certificates: For glass and glazing products, from manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass, coated glass, insulating glass, glazing sealants and glazing gaskets.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- H. Preconstruction adhesion and compatibility test report.
- I. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: coated float glass, laminated glass and insulating glass.
- F. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer
- G. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- H. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Glass Testing Agency Qualifications: An independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- I. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Division 08 Section "Aluminum-Framed Entrances and Storefronts and Aluminum Windows" to match glazing systems required for Project, including glazing methods.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

L. Preinstallation Conference: Conduct conference at project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone required by code, when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
 2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.
 3. Large-Missile Test: For all glazing, regardless of height above grade.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic glass lites, properties are based on units with lites 6.0 mm thick.
 2. For laminated glass lites, properties are based on products of construction indicated.
 3. For insulating glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide PPG Industries, Inc.; SOLARGRAY or comparable product by one of the following:
 - a. AGC Flat Glass North America, Inc.
 - b. Guardian Industries Corp.
 - c. Pilkington North America
2. Tint Color: Gray.
3. Visible Light Transmittance: 35 percent minimum.

2.3 INSULATING GLASS

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

1. Bendheim Corporation
2. JE Berkowitz, LP
3. PPG Industries, Inc.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from[one of] the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use N7.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. May National Associates, Inc.; Bondaflex Sil 290.
 - d. Pecora Corporation; 890.
 - e. Sika Corporation, Construction Products Division; SikaSil-C990.
 - f. Tremco Incorporated; Spectrem 1.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.9 MONOLITHIC-GLASS TYPES

A. Glass Type GL-1: Clear float glass.

1. Thickness: 6.0 mm.

B. Glass Type GL-2: Clear fully tempered float glass.

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

2.10 INSULATING-GLASS TYPES

A. Glass Type GL-3: Low-e-coated, tinted insulating glass.

1. Overall Unit Thickness: 1 inch (25 mm).
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Tinted float glass.
4. Interspace Content: Argon.
5. Indoor Lite: Clear float glass.
6. Low-E Coating: Sputtered on third surface.
7. Visible Light Transmittance: 35 percent minimum.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.27 maximum.
10. Solar Heat Gain Coefficient: 0.28 maximum.
11. Provide safety glazing labeling.

B. Glass Type GL-4: Low-e-coated, tinted insulating glass.

1. Overall Unit Thickness: 1 inch (25 mm).
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Tinted fully tempered float glass.
4. Interspace Content: Argon.
5. Indoor Lite: Clear fully tempered float glass.
6. Low-E Coating: Sputtered on third surface.
7. Visible Light Transmittance: 35 percent minimum.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.27 maximum.
10. Solar Heat Gain Coefficient: 0.28 maximum.
11. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-

glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413.

2.2 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.
1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
 2. Depth: 3-5/8 inches (92 mm).
- C. Slip-Type Head Joints: Provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
- D. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

2.3 AUXILIARY MATERIALS

- A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide asphalt saturated organic felt or foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to ceiling above.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert number> percent.

2.3 INTERIOR GYPSUM BOARD

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

1. American Gypsum.
2. CertainTeed Corp.
3. Lafarge North America Inc.
4. National Gypsum Company.
5. USG Corporation.

- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, or paper-faced galvanized steel sheet.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.6 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

1. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert number> percent.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

- E. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

CANNOT BE USED FOR BIDDING.

SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes acoustical tiles and suspension systems for ceilings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Drawn to scale and coordinating acoustical tile ceiling installation with hanger attachment to building structure and ceiling mounted items. Show size and location of initial access modules.
- C. Samples: For each exposed finish.
- D. Product test reports.
- E. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory.
- B. Fire-Test-Response Characteristics:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 2. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.
 - a. Smoke-Developed Index: 450 or less.

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILE CEILINGS, GENERAL

- A. Acoustical Tile Standard: Comply with ASTM E 1264.
- B. Metal Suspension System Standard: Comply with ASTM C 635.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire, ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
- E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Indicated design is based on the following criteria as supplied by Armstrong World Industries or approved equal.
 1. Surface texture: Medium.
 2. Composition: Mineral fiber.
 3. Color: White
 4. Size: As indicated on drawings
 5. Product: "Fine Fissured"
- C. LR: Not less than .85.
- D. NRC: Not less than .55, Type E-400 mounting per ASTM E 795.
- E. CAC: Not less than 35.
- F. Edge/Joint Detail: regular (excluding 2x4 lay in areas)

- G. Thickness: 5/8 inch.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc.; Prelude XL 15/16" Exposed Tee.
 - 2. USG Interiors, Inc.; Approved equal.

2.4 ACOUSTICAL TILES FOR KITCHEN AND BAR AREAS

- A. A. Products: Indicated design is based on the following criteria as supplied by Armstrong World Industries or approved equal.
 - 1. 1. Surface texture: vinyl laminate
 - 2. 2. Composition: drywall
 - 3. 3. Color: White
 - 4. 4. Size: As indicated on drawings
 - 5. 5. Product: National Gypsum
- B. A. LR: Not less than .75
- C. B. NRC: Not less than NA
- D. C. CAC: Not less than NA
- E. D. Edge/Joint Detail: flat / lay in
- F. E. Thickness: 1/2"

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.
- C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices.

When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
 2. Do not attach hangers to steel deck tabs or to steel roof deck.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

END OF SECTION 09 51 23

CANNOT BE USED FOR BIDDING.

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 SUBMITTALS

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

- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johnsonite.
 - b. Approved Equal

- B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Johnsonite Reveal
 2. Style: Straight (flat or toeless).
- C. Minimum Thickness: 1/4".
- D. Height: 4 inches.
- E. Lengths: Manufacturer standard 8' lengths.
- F. Outside Corners: Job mitered.
- G. Inside Corners: Job mitered.
- H. Finish: As selected by Architect from manufacturer's full range.
- I. Colors and Patterns: As indicated by manufacturer's designations.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.

- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

CANNOT BE USED FOR BIDDING

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes vinyl sheet flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of flooring. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples: For each exposed product and for each color and texture specified in manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore certification.
- C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 VINYL SHEET FLOORING WITH BACKING

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Altro Group; CS Line.
 2. Armstrong World Industries, Inc; Rejuvenations.
 3. Mannington Mills, Inc; Heterogeneous.
- B. Product Standard: ASTM F 1303.
1. Type (Binder Content): Type I, minimum binder content of 90 percent.
 2. Wear-Layer Thickness: Grade 1.
 3. Overall Thickness: As standard with manufacturer.
 4. Interlayer Material: None.
 5. Backing Class: Class A (fibrous).
- C. Wearing Surface: Smooth.
- D. Sheet Width: As standard with manufacturer.
- E. Seamless-Installation Method: Heat welded.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.
1. Adhesives shall have a VOC content of [50] [60] <Insert value> g/L or less.
 2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Seamless-Installation Accessories:
1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Color: Match flooring.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.2 RESILIENT SHEET FLOORING INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient sheet flooring.
- B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.
- C. Lay out resilient sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.

4. Avoid cross seams.
- D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.
- H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:
 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.
- B. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.
 1. Apply two coat(s).
- C. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 096516

SECTION 09 68 16 - SHEET CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes carpet.
- B. Related Work specified elsewhere
 - 1. Resilient base – Section 09 65 13

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show the following:
 - 1. Carpet type, color, and dye lot.
 - 2. Seam locations.
 - 3. Pattern type, repeat size, location, direction, and starting point.
 - 4. Pile direction.
 - 5. Insets and borders.
 - 6. Edge, transition, and other accessory strips.
 - 7. Transition details to other flooring materials.
 - 8. Carpet cushion.
- C. Samples: For each color and texture required.
 - 1. Carpet: 12-inch square Sample.
 - 2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch long Samples.
 - 3. Carpet Cushion: 6-inch square Sample.
- D. Product Schedule: For carpet use same designations indicated on Drawings.
- E. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Mockups: Before installing carpet, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

1.6 WARRANTY

- A. Special Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Allowance \$25.00/square yard installed

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:
 - a. Total VOCs: 10.00 mg/sq. m x h.
 - b. Formaldehyde: 0.05 mg/sq. m x h.
 - c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.
- C. Tackless Carpet Stripping: Water-resistant plywood, in strips as required to match cushion thickness and that comply with CRI 104, Section 12.2.

- D. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- D. Install pattern parallel to walls and borders.

END OF SECTION 09 68 16

CANNOT BE USED FOR BIDDING.

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Unfinished materials as indicated on drawings
 - 2. Previously finished materials as indicated on drawings

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.

1.3 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.2 PRIMERS/SEALERS

A. Alkali-Resistant Primer: MPI #3.

1. VOC Content: E Range of E1 or greater type.

B. Bonding Primer (Water Based): MPI #17.

1. VOC Content: E Range of E1 or greater type.

C. Bonding Primer (Solvent Based): MPI #69.

1. VOC Content: E Range of E1 or greater type.

2.3 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E1 or greater type.

B. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E1 or greater type.

2.4 EXTERIOR ALKYD PAINTS

A. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).

1. VOC Content: E Range of E1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
 - 1. Quick-Drying Enamel System: MPI EXT 5.1A.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Quick-drying enamel matching topcoat.
 - c. Topcoat: Quick-drying enamel (semigloss).
 - 2. Alkyd System: MPI EXT 5.3B.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel (semigloss).

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Steel.
 - 2. Gypsum board.

1.2 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.
- C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L of each material and color applied).

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 9 sq. ft. (1 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Primers, Sealers, and Undercoaters: 200 g/L.

- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Colors: Match existing adjacent color as approved by the Architect.

2.3 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: MPI #50.
 - 1. Duron Paints; Interior Acrylic Drywall Primer; DU0004124.
 - 2. Benjamin Moore; 100% Acrylic Superior Primer; 046/K046.
 - 3. PPG; SPEEDHIDE zero Interior Zero VOC Latex Sealer; 6-4900.

2.4 METAL PRIMERS

- A. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
 - 1. AkzoNobel; DEVSHIELD 4160 Multi-Purpose Tank&Structural Primer; 4160.
 - 2. PPG; Fast Dry 2.8 VOC; 94-258/269.
 - 3. Sherwin-Williams; Kem Bond HS Universal Alkyd Primer; B50WZ0004.

2.5 WATER-BASED PAINTS

- A. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.
 - 1. AkzoNobel; Wonder Pure Semi-Gloss Interior Latex Enamel; DRN33XX.
 - 2. Benjamin Moore; Waterborne Interior Semi-Gloss; 514/K514.
 - 3. PPG; Interior Semi-Gloss Latex; 9-500.

2.6 SOLVENT-BASED PAINTS

- A. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
 - 1. AkzoNobel; DEVGUARD 4308 Alkyd Gloss Industrial Enamel; 4308.
 - 2. Benjamin Moore; Rapid Dry Gloss Enamel; P20/KP20.
 - 3. PPG; Quick Drying Gloss Enamel; 95-9000.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Quick-Drying Enamel System:

- a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
- b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
- c. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7), MPI #96.

B. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System:

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

END OF SECTION 09 91 23

CANNOT BE USED FOR BIDDING

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Public-use washroom accessories.
 2. Underlavatory guards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify products using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. A & J Washroom Accessories, Inc.
 2. American Specialties, Inc.
 3. Bobrick Washroom Equipment, Inc.
 4. Bradley Corporation.
 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- C. Toilet Tissue (Roll) Dispenser TA-1:
1. Basis-of-Design Product: Boberick #B-4228.
 2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
 3. Mounting: Surface mounted.
 4. Operation: Eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty.
 5. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- D. Combination Towel (Folded) Dispenser/Waste Receptacle TA-2:
1. Basis-of-Design Product: Boberick #B-43699.
 2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
 3. Mounting: Surface mounted.
 4. Minimum Towel-Dispenser Capacity: 350 C-fold or 475 multifold paper towels.
 5. Minimum Waste-Receptacle Capacity: 3 gal. (11.3 L).
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
 7. Liner: Reusable, vinyl waste-receptacle liner.
 8. Lockset: Tumbler type for towel-dispenser compartment.
- E. Liquid-Soap Dispenser TA-3:
1. Basis-of-Design Product: Boberick #B-4112.
 2. Description: Designed for dispensing soap in liquid or lotion form.
 3. Mounting: Surface mounted.
 4. Capacity: 40 oz. (1.2 L).
 5. Materials: Black molded plastic push-button valve, antibacterial soap resistant plastic cylinder reservoir.
 6. Lockset: Tumbler type.
 7. Refill Indicator: Window type.

F. Grab Bar TA-4a:

1. Basis-of-Design Product: Boberick #B-5806 x 18.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches (32 mm).
5. Configuration and Length: Straight, 18 inches (457 mm) long.

G. Grab Bar TA-4b:

1. Basis-of-Design Product: Boberick #B-5806 x 36.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches (32 mm).
5. Configuration and Length: Straight, 36 inches (914 mm) long.

H. Grab Bar TA-4c:

1. Basis-of-Design Product: Boberick #B-5806 x 42.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches (32 mm).
5. Configuration and Length: Straight, 42 inches (1067 mm) long.

I. Seat-Cover Dispenser TA-5:

1. Basis-of-Design Product: Boberick #B-4221.
2. Mounting: Surface mounted.
3. Minimum Capacity: 250 seat covers.
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.

J. Mirror Unit TA-6:

1. Basis-of-Design Product: Boberick #B-165-2448.
2. Frame: Stainless-steel channel.
 - a. Corners: Manufacturer's standard.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

- a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Size: 24" x 48".
- K. Robe Hook TA-7:
1. Basis-of-Design Product: Boberick #B-6777.
 2. Description: Single-prong unit.
 3. Material and Finish: Stainless steel, No. 4 finish (satin).

2.2 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Plumberex Specialty Products, Inc.
 2. Truebro by IPS Corporation.
- C. Underlavatory Guard TA-8:
1. Basis-of-Design Product: TRUEBRO, LAV GUARD2.
 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, molded plastic, white.

2.3 FABRICATION

- A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

END OF SECTION 10 28 00

CANNOT BE USED FOR BIDDING.

SECTION 12 35 30 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes kitchen cabinets.
- B. Related Requirements:
 - 1. Section 12 36 23.13 "Plastic-Laminate-Clad Countertops."

1.2 DEFINITIONS

- A. MDF: Medium-density fiberboard.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Cabinets.
 - 2. Cabinet hardware.
- B. Shop Drawings: Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, and hardware.
- C. Samples: For cabinet finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For casework.

PART 2 - PRODUCTS

2.1 CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis of Design Product: Subject to compliance with requirements, provide American Woodmark Corporation; Newport cabinets or comparable product by one of the following:
 - 1. Armstrong Cabinet Products.
 - 2. KraftMaid Cabinetry, Inc.

3. Merillat Industries, LLC.

C. Quality Standard: Provide cabinets that comply with KCMA A161.1.

1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with the above standard.

D. Face Style: Lipped overlay.

E. Cabinet Style: Face frame.

F. Door and Drawer Fronts: Solid-wood stiles and rails, 5/8 inch (16 mm) thick, with 3/4-inch- (19-mm-) thick, solid-wood center panels.

G. Face Frames: 3/4-by-1-5/8-inch (19-by-41-mm) solid wood with glued mortise and tenon or doweled joints.

H. Exposed Cabinet End Finish: Wood veneer.

2.2 CABINET MATERIALS

A. General:

1. Adhesives and Composite Wood and Agrifiber Products: Do not use products that contain urea formaldehyde.
2. Hardwood Lumber: Kiln dried to 7 percent moisture content.
3. Softwood Lumber: Kiln dried to 10 percent moisture content.
4. Hardwood Plywood: HPVA HP-1; made with adhesive containing no urea formaldehyde.
5. Particleboard: ANSI A208.1, Grade M-2; made with binder containing no urea formaldehyde.
6. MDF: ANSI A208.2, Grade MD; made with binder containing no urea formaldehyde.
7. Hardboard: ANSI A135.4, Class 1 Tempered.

B. Exposed Materials:

1. Exposed Wood Species: Oak.
 - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish: As selected by Architect from manufacturer's full range.
2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.

C. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces or stained to be compatible with exposed surfaces.
- D. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; MDF; or hardboard.

2.3 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Architect from manufacturer's full range.
- B. Pulls: Wire pulls.
- C. Hinges: Concealed European-style, self-closing hinges.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides, designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.
- B. Install cabinets without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install cabinets level and plumb to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).
- D. Fasten cabinets to adjacent units and to backing.
 1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips.

3.2 ADJUSTING AND CLEANING

- A. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 12 35 30

SECTION 12 36 23.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic-laminate countertops.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product high-pressure decorative laminate.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Plastic laminates, for each color, pattern, and surface finish.

1.3 INFORMATIONAL SUBMITTALS

- A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. Provide labels from AWI certification program indicating that countertops comply with requirements of grades specified.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Formica Corporation.
 - b. Lamin-Art, Inc.
 - c. Wilsonart International; Div. of Premark International, Inc.
- D. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP, and as follows:
 1. Laminate has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.9.5:
 - a. Nitric Acid (30 Percent): Moderate effect.
 - b. Sulfuric Acid (77 Percent): Moderate effect.
 - c. Hydrochloric Acid (37 Percent): Moderate effect.
 - d. Phosphoric Acid (75 Percent): No effect.
 - e. Acetic Acid (98 Percent): No effect.
 - f. Formaldehyde: No effect.
 - g. Ethyl Acetate: No effect.
 - h. Ethyl Ether: No effect.
 - i. Phenol (85 Percent): Moderate effect.
 - j. Benzene: No effect.
 - k. Xylene: No effect.
 - l. Butyl Alcohol: No effect.
 - m. Furfural: No effect.
 - n. Methyl Ethyl Ketone: No effect.
 - o. Sodium Hydroxide (25 Percent): No effect.
 - p. Sodium Sulfide (15 Percent): No effect.
 - q. Ammonium Hydroxide (28 Percent): No effect.
 - r. Zinc Chloride: No effect.
 - s. Gentian Violet: No effect.
 - t. Methyl Red: No effect.
- E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 1. As indicated by manufacturer's designations.
 2. Match Architect's sample.
 3. As selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Wood grains, matte finish.
 - c. Patterns, matte finish.

- F. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- G. Core Material at Sinks: Particleboard made with exterior glue or medium-density fiberboard made with exterior glue.
- H. Core Thickness: 3/4 inch (19 mm).
 - 1. Build up countertop thickness to 1-1/2 inches (38 mm) at front, back, and ends with additional layers of core material laminated to top.
- I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
- J. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSLA208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 2. Softwood Plywood: DOC PS 1.

2.3 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
 - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Prepare edges to be joined in shop so Project site processing of top and edge surfaces is not required.
 - 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c..
 - 3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

END OF SECTION 12 36 23.13

**DIVISION 22 SECTION 22 05 00
COMMON WORK RESULTS FOR PLUMBING
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SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1. GENERAL

1.1. SUMMARY

- A. All work under Division 22 is subject to the Division 01, *General Requirements, the General Conditions and Supplementary Conditions*.
- B. Provide all labor, materials, equipment, and services necessary for and incidental to the complete installation and operation of all plumbing work.
- C. Unless otherwise specified, all submissions shall be made to, and acceptances and approvals made by the Architect and the Engineer.
- D. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange piping, equipment, and other work generally as shown on the contract drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in accordance with *Submittals* specified below. The right is reserved to make reasonable changes in location of equipment, piping, up to the time of rough-in or fabrication.
- E. Conform to the requirements of all rules, regulations and codes of local, state and federal authorities having jurisdiction.
- F. Coordinate the work under Division 22 with the work of all other construction trades.
- G. Be responsible for all construction means, methods, techniques, procedures, and phasing sequences used in the work. Furnish all tools, equipment and materials necessary to properly perform the work in first class, substantial, and workmanlike manner, in accordance with the full intent and meaning of the contract documents.

1.2. PERMITS AND FEES

- A. Obtain all permits and pay taxes, fees and other costs in connection with the work. File necessary plans, prepare documents, give proper notices and obtain necessary approvals. Deliver inspection and approval certificates to Owner prior to final acceptance of the work.
- B. Permits and fees shall comply with the Division 01, *General Requirements* of the specification.

1.3. EXAMINATION OF SITE

- A. Examine the site, determine all conditions and circumstances under which the work must be done, and make all necessary allowances for same. No additional cost to the Owner will be permitted for contractors failure to do so.
- B. Examine and verify specific conditions described in individual specifications sections.

1.4. CONTRACTOR QUALIFICATION

- A. Any Contractor or Subcontractor performing work under Division 22 shall be fully qualified and acceptable to the Architect and Owner. Submit the following evidence when requested:
 - 1. A list of not less than five comparable projects which the Contractor completed.
 - 2. Letter of reference from not less than three registered professional engineers, general contractors or building owners.
 - 3. Local and/or State License, where required.
 - 4. Membership in trade or professional organizations where required.
- B. A Contractor is any individual, partnership, or corporation, performing work by contract or subcontract on this project.
- C. Acceptance of a Contractor or Subcontractor will not relieve the Contractor or subcontractor of any contractual requirements, or his responsibility to supervise and coordinate the work, of various trades.

1.5. MATERIALS AND EQUIPMENT

- A. Materials and equipment installed as a permanent part of the project shall be new, unless otherwise indicated or specified, and of the specified type and quality.
- B. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish named item, or its equal, subject to approval by Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for available space, required arrangement, and application. Submit all data necessary to determine suitability of substituted items, for approval.
- C. The suitability of named item only has been verified. Where more than one item is named, only the first named item has been verified as suitable. Substituted items, including items other than first named shall be equal or better in quality and performance to that of specified items, and must be suitable for available space, required arrangement and application. Contractor, by providing other than the first named manufacturer, assumes responsibility for all necessary adjustments and modifications necessary for a satisfactory installation. Adjustments and modifications shall include but not be limited to electrical, structural, support, and architectural work.
- D. Substitution will not be permitted for specified items of material or equipment where noted.
- E. All items of equipment furnished shall have a service record of at least five (5) years.

1.6. FIRE SAFE MATERIALS

- A. Unless otherwise indicated, materials and equipment shall conform to UL, NFPA and

ASTM standards for fire safety with smoke and fire hazard rating not exceeding flame spread of 25 and smoke developed of 50.

1.7. REFERENCED STANDARDS, CODES AND SPECIFICATIONS

- A. Specifications, Codes and Standards listed below are included as part of this specification, latest edition.
- B. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
- C. ASME - American Society of Mechanical Engineers
- D. ASPE - American Society of Plumbing Engineers
- E. ASTM - American Society for Testing and Materials
- F. AWWA - American Water Works Association
- G. CS - Commercial Standard
- H. DNREC - Delaware Department of Natural Resources and Environmental Control
- I. EPA - Environmental Protection Agency
- J. FM - Factory Mutual
- K. IBC - International Building Code
- L. IEEE - Institute of Electrical and Electronics Engineers
- M. MSSP - Manufacturers Standards Society of the Valve and Fittings Industry
- N. NEC - National Electrical Code
- O. NEMA - National Electrical Manufacturers Association
- P. NSF - National Sanitation Foundation
- Q. UL - Underwriters' Laboratories

- R. All plumbing equipment and materials shall comply with the codes and standards listed in the latest edition of ASHRAE HVAC Applications Handbook, Chapter entitled *Codes and Standards*.

1.8. SUBMITTALS, REVIEW AND ACCEPTANCE

- A. Equipment, materials, installation, workmanship and arrangement of work are subject to review and acceptance. No substitution will be permitted after acceptance of equipment or materials except where such substitution is considered by the Architect to be in best interest of Owner.
- B. After acceptance of Material and Equipment List, submit three (3) copies or more as required under General Conditions of complete descriptive data for all items. Data shall consist of specifications, data sheets, samples, capacity ratings, performance curves, operating characteristics, catalog cuts, dimensional drawings, wiring diagrams, installation instructions, and any other information necessary to indicate complete compliance with Contract Documents. Edit submittal data specifically for application to this project.
- C. Thoroughly review and stamp all submittals to indicate compliance with contract requirements prior to submission. Coordinate installation requirements and any electrical requirements for equipment submitted. Contractor shall be responsible for correctness of all submittals.

- D. Submittals will be reviewed for general compliance with design concept in accordance with contract documents, but dimensions, quantities, or other details will not be verified.
- E. Identify submittals, indicating intended application, location and service of submitted items. Refer to specification sections or paragraphs and drawings where applicable. Clearly indicate exact type, model number, style, size and special features of proposed item. Submittals of a general nature will not be acceptable. For substituted items, clearly list on the first page of the submittal all differences between the specified item and the proposed item. The contractor shall be responsible for corrective action and maintaining the specification requirements if differences have not been clearly indicated in the submittal.
- F. Submit actual operating conditions or characteristics for all equipment where required capacities are indicated. Factory order forms showing only required capacities will not be acceptable. Call attention, in writing, to deviation from contract requirements.
- G. Acceptance will not constitute waiver of contract requirements unless deviations are specifically indicated and clearly noted. Use only final or corrected submittals and data prior to fabrication and/or installation.
- H. For any submittal requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return of any reason.

1.9. SHOP DRAWINGS

- A. Prepare and submit shop drawings for all plumbing equipment, specially fabricated items, modifications to standard items, specially designed systems where detailed design is not shown on the contract drawings, or where the proposed installation differs from that shown on contract drawings.
- B. Submit data and shop drawings including but not limited to the list below, in addition to provisions of the paragraph above. Identify all shop drawings by the name of the item and system and the applicable specification paragraph number and drawing number.
- C. Every submittal including, but not limited to the list below, shall be forwarded with its own transmittal as a separate, distinct shop drawing. Grouping of items/systems that are not related shall be unacceptable.

D. Items and Systems

Access Doors/Panels including layout and location
Drip Pans
Fire Stopping - Methods and Materials
Identification System
Interceptors
Material and Equipment List
Operations and Maintenance Manuals
Pipe Materials
Plumbing Fixtures & Trim

Test Certificates
Thermostatic Mixing Valves
Valves
Wiring Diagrams, Flow Diagrams and Operating Instructions

- E. Contractor, additionally, shall submit for review any other shop drawings as required by the Architect. No item shall be delivered to the site, or installed, until the Contractor has received a submittal from the Engineer marked *Reviewed* or *Comments Noted*. After the proposed materials have been reviewed, no substitution will be permitted except where approved by the Architect.

1.10. SUPERVISION AND COORDINATION

- A. Provide complete supervision, direction, scheduling, and coordination of all work under the Contract, including that of subcontractors.
- B. Coordinate rough-in of all work and installation of sleeves, anchors, and supports for piping, equipment, and other work performed under Division 22.
- C. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- D. Coordinate electrical work required under Division 22 with that under Division 26. Coordinate all work under Division 22 with work under all other Divisions.
- E. Supply services of an experienced (10 years minimum) and competent Project Manager to be in constant charge of work at site.
- F. Where a discrepancy exists within the specifications or drawings or between the specifications and drawings, the more stringent (or costly) requirement shall apply until clarification can be obtained from the Engineer. Failure to clarify such discrepancies with the Engineer will not relieve the Contractor of the responsibility of conforming to the requirements of the Contract.
- G. Failure of contractor to obtain a full and complete set of contract documents (either before or after bidding) will not relieve the contractor of the responsibility of complying with the intent of the contract documents.

1.11. CUTTING AND PATCHING

- A. Accomplish all cutting and patching necessary for the installation of work under Division 22. Damage resulting from this work to other work already in place, shall be repaired at Contractor's expense. Where cutting is required, perform work in neat and workmanlike manner. Restore disturbed work to match and blend with existing construction and finish, using materials compatible with the original. Use mechanics skilled in the particular trades required.
- B. Do not cut structural members without approval from the Architect.

1.12. CONNECTIONS AND ALTERATIONS TO EXISTING WORK

- A. Unless otherwise noted on the drawings, where existing plumbing work is removed all pipes, valves, etc., shall be removed, including hangers, to a point below finished floors or behind finished walls and capped. Such point shall be far enough behind finished surfaces to allow for installation of normal thickness of required finish material.
- B. Where work specified in Division 22 connects to existing equipment, piping, etc., Contractor shall perform all necessary alterations, cuttings, fittings, etc., of existing work as may be necessary to make satisfactory connections between new and existing work, and to leave completed work in a finished and workmanlike condition.
- C. Where the relocation of existing equipment is required for access or the installation of new equipment, the contractor shall temporarily remove and/or relocate and re-install as required to leave the existing and new work in a finished and workman like condition.

1.13. DEMOLITION

- A. Unless otherwise noted all existing equipment, piping, etc. shall remain.
- B. Where existing equipment is indicated to be removed, all associated piping, conduit, power, controls, insulation, hangers, supports and housekeeping pads, etc., patch, paint and repair walls/roof/floor to match existing and/or new finishes.
- C. Provide necessary piping, valves, traps, temporary feeds, etc., as required. Drain and refill piping systems as often as necessary to accommodate phasing and to minimize time lengths of outages.
- D. The Contractor shall be responsible for visiting the site and determining the existing conditions in which the work is to be performed.
- E. Where any abandoned pipes in existing floors, walls, pipe tunnels, ceilings, etc., conflict with new work, remove abandoned pipes as necessary to accommodate new work.
- F. The location of all existing equipment, piping, etc., indicated is approximate only and shall be checked and verified. Install all new plumbing work to connect to or clear existing work as applicable.
- G. Maintain egress at all times. Coordinate egress requirements with the State Fire Marshal, the Owner and the authorities having jurisdiction.
- H. Existing piping, equipment, materials, etc., not required for re-use or re-installation in this project, shall be removed from the project site.
- I. All other materials and equipment which are removed shall become property of the Contractor and shall be promptly removed, from the premises, and disposed of by the Contractor, in an approved manner.
- J. Where piping is removed, remove all pipe hangers which were supporting the removed piping. Patch the remaining penetration voids with like materials and paint to match existing construction.
- K. Before demolition begins, and in the presence of the Owners representative, test and note

all deficiencies in all existing systems affected by demolition but not completely removed by demolition. Provide a copy of the list of system deficiencies to the Owner and the Engineer. Videotape existing conditions in each space prior to beginning demolition work.

- L. The Owner shall have the first right of refusal for all plumbing fixtures, devices and equipment removed by the Contractor.
- M. All plumbing fixtures, devices and equipment designated by the Owner to remain the property of the Owner shall be moved and stored by the Contractor at a location on site as designated by the Owner. It shall be the Contractor's responsibility to store all plumbing fixtures, devices and equipment in a safe manner to prevent damage while stored.
- N. All existing equipment refused by the Owner shall become the property of the Contractor and shall be removed from the site by the Contractor in a timely manner and disposed of in a legal manner.
- O. Work Abandoned in Place: cut and remove underground pipe a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.
- P. Terminate services and utilities in accordance with local laws, ordinances, rules and regulations.

1.14. EXCAVATION AND BACKFILLING

A. GENERAL

- 1. Perform all necessary excavation, or installation of work under Division 22, in whatever materials or conditions encountered, using suitable methods and equipment.
- 2. Accurately establish required lines and grades and properly locate the work.
- 3. Determine the locations of all existing utilities before commencing the work.

B. Excavation: (Refer also to other portions of the specifications)

- 1. Excavate only the required elevations. If excavation is carried below the foundation lines or other required limits, backfill the excess with concrete.
- 2. Keep banks of trenches as nearly vertical as possible, and provide sheeting and/or shoring as required for protection of work and safety of personnel. Follow local, State, and OSHA Guidelines.
- 3. Keep excavations dry. Protect excavations from freezing.

C. Backfilling: (Refer also to other portions of the specifications)

- 1. Backfill excavations to the required elevations and restore surfaces to their original or required conditions.

2. Backfill shall be similar material, free from objectionable matter such as rubbish, roots, stumps, brush, rocks and other sharp objects. Unless otherwise indicated, suitable material from the excavation may be used for backfill.
3. Carefully place and mechanically tamp backfill in layers not exceeding 12 inches loose thickness. Compact to 95 percent minimum.
4. Do not backfill against frozen material. Do not use frozen material for backfill.

1.15. FASTENERS

- A. All fasteners located in public spaces including corridors, lobbies, etc., shall be provided with tamper proof fasteners. Provide Pin Phillips hardware as manufactured by Challenge Industries or approved equal.

1.16. DEFINITIONS

- A. *Approve* - to permit use of material, equipment or methods conditional upon compliance with contract documents requirements.
- B. *Furnish and install or provide* means to supply, erect, install, and connect to complete for readiness for regular operation, the particular work referred to.
- C. *Contractor* means the mechanical contractor and any of his subcontractors, vendors, suppliers, or fabricators.
- D. *Piping* includes pipe, all fittings, valves, hangers, insulation, identification, and other accessories relative to such piping.
- E. *Concealed* means hidden from sight in chases, formed spaces, shafts, hung ceilings, embedded in construction or attic.
- F. *Exposed* means not installed underground or *concealed* as defined above.
- G. *Invert Elevation* means the elevation of the inside bottom of pipe.
- H. *Finished Spaces*: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceiling, unexcavated spaces, crawl spaces, and tunnels.
- I. *Review* - limited observation or checking to ascertain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.
- J. *Building Line*: Exterior wall of building.

1.17. MINIMUM EFFICIENCY REQUIREMENTS

- A. All plumbing equipment shall be manufactured to provide the minimum efficiency requirements as specified in ASHRAE Standard 90.1, latest edition.

- B. All piping and equipment insulation shall comply with ASHRAE Standard 90.1, latest edition.
- C. All plumbing devices, controls, accessories, and components shall be manufactured to provide the minimum efficiency requirements as specified in ASHRAE Standard 90.1, latest edition.

1.18. LEAD FREE REQUIREMENTS

- A. All plumbing fixtures, equipment, and devices that contact potable water must be lead free per the State requirements.

PART 2. ELECTRICAL REQUIREMENTS – NOT USED

PART 3. EXECUTION

3.1. EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the work are shown only in diagrammatic form. Refer conflicts to the Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.
- E. Install equipment giving right of way to piping installed at required slope.

3.2. SUPPORTS, HANGERS AND FOUNDATIONS

- A. Provide supports, hangers, braces, attachments and foundations required for the work. Support and set the work in a thoroughly substantial and workmanlike manner without placing strains on materials, equipment, or building structure, submit shop drawings for approval. Coordinate all work with the requirements of the structural division.
- B. Supports, hangers, braces, and attachments shall be standard manufactured items or fabricated structural steel shapes. All interior hangers shall be galvanized or steel with rust inhibiting paint. For un-insulated copper piping provide copper hanger to prevent contact of dissimilar metals. All exterior hangers shall be constructed of stainless steel utilizing stainless steel rods, nuts, washers, bolts, etc.

3.3. PROVISIONS FOR ACCESS

- A. The contractor shall provide access panels and doors for all concealed equipment, valves, controls, cleanouts, traps, and other devices requiring maintenance, service, adjustment, balancing or manual operation.

- B. Where access doors are necessary, furnish and install manufactured painted steel door assemblies consisting of hinged door, key locks, and frame designed for the particular wall or ceiling construction. Properly locate each door. Door sizes shall be a 12 inches x 12 inches for hand access, 18 inches x 18 inches for shoulder access and 24 inches x 24 inches for full body access where required. Review locations and sizes with Architect prior to fabrication. Provide U.L. approved and labeled access doors where installed in fire rated walls or ceilings. Doors shall be Milcor Metal Access Doors as manufactured by Inland-Ryerson, Mifab, or approved equal.
1. Acoustical or Cement Plaster: Style B
 2. Hard Finish Plaster: Style K or L
 3. Masonry or Dry Wall: Style M
- C. Where access is by means of liftout ceiling tiles or panels, mark each ceiling grid using small color-coded and numbered tabs. Provide a chart or index for identification. Place markers within ceiling grid not on ceiling tiles.
- D. Access panels, doors, etc. described herein shall be furnished under the section of specifications providing the particular service and to be turned over to the pertinent trade for installation. Coordinate installation with installing contractor. All access doors shall be painted in baked enamel finish to match ceiling or wall finish.
- E. Submit shop drawings indicating the proposed location of all access panels/doors. Access doors in finished spaces shall be coordinated with air devices, lighting and sprinklers to provide a neat and symmetrical appearance.

3.4. PAINTING AND FINISHES

- A. Provide protective finishes on all materials and equipment. Use coated or corrosion-resistant materials, hardware and fittings throughout the work. Paint bare, untreated ferrous surfaces with rust-inhibiting paint. All exterior components including supports, hangers, nuts, bolts, washers, vibration isolators, etc. shall be stainless steel.
- B. Clean surfaces prior to application of insulation, adhesives, coatings, paint, or other finishes.
- C. Provide factory-applied finishes where specified. Unless otherwise indicated factory-applied paints shall be baked enamel with proper pretreatment.
- D. Protect all finishes and restore any finishes damaged as a result of work under Division 22 to their original condition.
- E. The preceding requirements apply to all work, whether exposed or concealed.
- F. Remove all construction marking and writing from exposed equipment, piping and building surfaces. Do not paint manufacturer's labels or tags.
- G. All exposed piping, equipment, etc. shall be painted. Colors shall be as stated in this division or as selected by the Architect and conform to ANSI Standards.

- H. All exterior roof mounted equipment, piping and vents shall be painted to match roof in color as selected by Architect.
- I. All exposed piping, equipment, etc. in finished spaces shall be painted. Colors shall be as selected by the Architect and conform to ANSI Standards.
- J. All exposed piping, equipment, etc., in Mechanical Rooms, and Storage where PVC jacketed shall not require painting. Label and identify and color code as specified.

3.5. CLEANING OF SYSTEMS

- A. Thoroughly clean systems after satisfactory completion of pressure tests and before permanently connecting fixtures, equipment, traps, strainers, and other accessory items. Blow out and flush piping until interior surfaces are free of foreign matter.
- B. Flush piping in re-circulating water systems to remove cutting oil, excess pipe joint compound, solder slag and other foreign materials. Do not use system pumps until after cleaning and flushing has been accomplished to the satisfaction of the Engineer. Employ chemical cleaners, including a non-foaming detergent, not harmful to system components. After cleaning operation, final flushing and refilling, the residual alkalinity shall not exceed 300 parts per million. Submit a certificate of completion to Engineer stating name of service company used.
- C. Pay for labor and materials required to locate and remove obstructions from systems that are clogged with construction refuse after acceptance. Replace and repair work disturbed during removal of obstructions.
- D. Leave systems clean, and in complete running order.

3.6. COLOR SELECTION

- A. Color of finishes shall be as selected by the Architect.
- B. Submit color of factory-finished equipment for acceptance prior to ordering.

3.7. PROTECTION OF WORK

- A. Protect work, material and equipment from weather and construction operations before and after installation. Properly store and handle all materials and equipment.
- B. Cover temporary openings in piping and equipment to prevent the entrance of water, dirt, debris, or other foreign matter. Deliver pipes and tubes with factory applied end caps.
- C. Cover or otherwise protect all finishes.
- D. Replace damaged materials, devices, finishes and equipment.
- E. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, where stored inside.

3.8. OPERATION OF EQUIPMENT

- A. Clean all systems and equipment prior to initial operation for testing, balancing, or other purposes.
 - B. Where specified, or otherwise required, provide the services of the manufacturer's factory-trained servicemen or technicians to start up the equipment. Where factory start-up of equipment is not specified, provide field start-up by qualified technician.
 - C. Upon completion of work, clean and restore all equipment to new conditions.
- 3.9. IDENTIFICATIONS, FLOW DIAGRAMS, ELECTRICAL DIAGRAMS AND OPERATING INSTRUCTIONS
- A. Provide three (3) copies of operating and maintenance instructions for all principal items of equipment furnished. This material shall be bound as a volume of the *Operations and Maintenance Manuals* as hereinafter specified.
 - B. All piping installed under this contract shall be stenciled with *direction of flow* arrows and with stenciled letters naming each pipe and service. Refer to Division 22 Section, *Plumbing Piping, Fittings, Valves, Etc.* Color code all direction of flow arrows and labels. In finished spaces omit labeling and direction of flow arrows. Paint in color as selected by Architect.
 - C. Submit list of wording, symbols, letter size, and color coding for plumbing identification. Submit samples of equipment identification cards, piping labels, labels, and valve tags to Engineer for review prior to installation.
 - D. Contractor shall demonstrate Sequences of Operation of all plumbing equipment in presence of Owner's representative, Engineer, and ATC subcontractor.
- 3.10. WALL AND FLOOR PENETRATION
- A. All penetrations of partitions, ceilings, roofs and floors by piping or conduit under Division 22 shall be sleeved, sealed, and caulked airtight for sound and air transfer control. Penetrations of mechanical room partitions, ceilings, and floors shall be as specified in Division 07 Section, *HVAC and Plumbing Penetration Firestopping*.
 - B. All penetration of fire rated assemblies shall be sleeved, sealed, caulked and protected to maintain the rating of the wall, roof, or floor. Fire Marshal approved U.L. assemblies shall be utilized. See Division 07 Section, *HVAC and Plumbing Penetration Firestopping*.
 - C. Provide pipe escutcheons and duct flanges for sleeved pipes and ducts in finished areas.
 - D. Piping sleeves:
 - 1. Galvanized steel pipe, standard weight where pipes are exposed and roofs and concrete and masonry walls. On exterior walls provide anchor flange welded to perimeter.
 - 2. Twenty-two (22) gauge galvanized steel elsewhere.

3.11. RECORD DRAWINGS

- A. Upon completion of the mechanical installations, the Contractor shall deliver to the Architect one complete set of prints of the mechanical contract drawings which shall be legibly marked in red pencil to show all changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings.
- B. Contractor shall incorporate all sketches, addendums, value engineering, change orders, etc., into record drawings prior to delivering to Architect.

3.12. WARRANTY

- A. Contractor's attention is directed to warranty obligations contained in the *General Conditions and Supplementary Conditions*.
- B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of equipment manufacturer's warranties shall be included in the operations and maintenance manuals.
- C. The contractor guarantees for a two year period from the time of final acceptance by the Owner.
 - 1. That the work contains no faulty or imperfect material or equipment or any imperfect, careless, or unskilled workmanship.
 - 2. That all work, equipment, machines, devices, etc. shall be adequate for the use to which they are intended, and shall operate with ordinary care and attention in a satisfactory and efficient manner.
 - 3. That the contractor will re-execute, correct, repair, or remove and replace with proper work, without cost to the Owner, any work found to be deficient. The contractor shall also make good all damages caused to their work or materials in the process of complying with this section.
 - 4. That the entire work shall be water-tight and leak-proof.

3.13. OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall have prepared three (3) copies of the *Operations and Maintenance Manuals* and deliver these copies of the manuals to the Owner. The manuals shall be as specified herein. The manuals must be approved and will not be accepted as final until so stamped.
- B. The manuals shall be bound in a three-ring loose-leaf binder similar to National No. 3881 with the following title lettered on the front: *Operations and Maintenance Manual Delaware State Police Troop #1 Modifications – Plumbing Systems*. No sheets larger than 8-1/2 inches x 11 inches shall be used, except sheets that are neatly folded to 8-1/2 inches x 11 inches and used as a pull-out. Provide divider tabs and table of contents for organizing and separating information.

- C. Provide the following data in the booklet:
1. As first entry, an approved letter indicating the starting/ending time of Contractor's warranty period.
 2. Catalog data on each piece of plumbing equipment furnished.
 3. Complete catalog data on each piece of plumbing equipment furnished including approved shop drawing.
 4. Provide sales and authorized service representatives names, address, and phone numbers of all equipment and subcontractors.
 5. Provide supplier and subcontractor's names, address, and phone number.
 6. Catalog data of all equipment, valves, etc. shall include wiring diagrams, parts list and assembly drawing.
 7. Access panel charts with index illustrating the location and purpose of access panels.
 8. Approved Health and Plumbing Certificates.
 9. Start-up reports for equipment.
- D. Submit *Operations and Maintenance Manuals* prior to the anticipated date of substantial completion for Engineer review and approval. Substantial completion requires that *Operations and Maintenance Manuals* reviewed and approved.

3.14. PIPING SYSTEMS TESTING

- A. The entire new plumbing piping systems shall be tested hydrostatically before insulation covering is applied and proven tight under the following gauge pressures for a duration of four (4) hours. Testing to be witnessed by Owner's representative and documented in writing.

SYSTEM	TEST PRESSURE
Domestic Water Piping	100 psi

- B. All waste, vent and water piping shall be tested by the Contractor and approved by the Engineer before acceptance. The costs of all equipment required for tests are to be included in the contract price.
- C. Upon completion of roughing-in and before setting equipment and fixtures, the entire new water piping system shall be tested at a hydrostatic pressure of not less than one hundred (100) pounds per square inch gauge and proven tight at this pressure. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately in a manner described for the entire system.
- D. Testing and acceptance thereof shall be in accordance with local requirements and shall meet approval of authority having jurisdiction. Submit certificates and approved permits and insert one (1) copy in the *Operations and Maintenance Manuals*.

3.15. OUTAGES

- A. Provide a minimum of fourteen (14) days notice to schedule outages. The Contractor shall include in their bid outages and/or work in occupied areas to occur on weekends,

holidays, or at night. Coordinate and get approval of all outages with the Owner.

- B. Submit *Outage Request form*, attached at end of his Section, to Owner for approval.

END OF SECTION

CANNOT BE USED FOR BIDDING.

OUTAGE REQUEST

DATE APPLIED: _____ BY: _____

DATE FOR OUTAGE: _____ FIRM: _____

START OUTAGE-TIME: _____ DATE: _____

END OUTAGE -- TIME: _____ DATE: _____

AREAS AND ROOMS: _____

FLOOR(S): _____

AREA(S): _____

ROOM(S): _____

WORK TO BE PERFORMED: _____

SYSTEM(S): _____

REQUEST APPROVED BY: _____

(FOREMAN OR OTHER PERSON IN CHARGE)

(FOR OWNER'S USE ONLY):

APPROVED: _____

YES ___ NO ___ BY: _____ DATE: _____

DATE/TIME-AS REQUESTED: _____ OTHER : _____

OWNER'S PRESENCE REQUIRED: _____

YES: ___ NO: ___ NAME: _____

POINT OF CONTACT: _____ PHONE: _____

**DIVISION 22 SECTION 22 05 05
PLUMBING PIPING, FITTINGS AND VALVES
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CANNOT BE USED FOR BIDDING.

SECTION 22 05 05 - PLUMBING PIPING, FITTINGS AND VALVES

PART 1. GENERAL

1.1. SUMMARY

- A. The conditions of the contract and other general requirements apply to the work specified in this section. All work under this section shall also be subject to the requirements of Division 22 Section, *Common Work Results for Plumbing* and Division 01, *General Requirements*.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SYSTEM DESCRIPTION CONDITIONS

- A. Provide all labor and materials necessary to furnish and install all piping systems on this project as herein specified and/or shown on the drawings. Final connections to equipment furnished in other sections of the specifications shall be included under this section.
- B. All piping and insulation installed in ceiling plenums must be plenum rated and comply with NFPA and International Building Code (IBC).
- C. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- D. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- E. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- F. Provide pipe hangers and supports in accordance with ASTM B31.9 and MSS SP69 unless indicated otherwise.
- G. At all runout piping serving equipment, use swing joints with elbows to prevent excessive movement of piping due to expansion.

1.3. QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Maintain one copy of each document on site.

1.4. DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under as hereinbefore specified.

- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- 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 systems.

1.5. ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2. PRODUCTS

2.1. PIPE MATERIALS

- A. All materials, unless otherwise specified, shall be new and of the best quality of their respective kinds, and shall conform to the requirements and ordinances of local, state and insurance authorities having jurisdiction.

1. Sanitary Underground - Within Building to 5 Feet Outside of Foundation Wall:

- a). Pipe & Fittings: Cast iron soil pipe, Hubless cast iron soil pipe and fittings must be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International as compliant with CISPI 301. Hubless pipe and fittings shall be joined using Heavy Duty Shielding Coupling, ASTM C 1540 Type 304 Stainless Steel corrugated shield and bands, and polychloroprene (neoprene) based rubber sleeve conforming to ASTM C564.

- b). Service Weight pipe and fittings must be marked with the Cast Iron Soil Pipe Institute collective trademark and listed by NSF International as compliant with ASTM A 74. Gaskets must be polychloroprene (neoprene) based rubber Service Weight type conforming to ASTM C564.

i. Approved manufacturers:

- 1) AB&I
- 2) Charlotte
- 3) Tyler

2. Sanitary and Vents Above Floor Inside Building:

- a). Pipe & Fittings: Cast iron *No-Hub* pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International as compliant with CISPI 301, ASTM C564. Installation and support shall be in accordance with Cast Iron Soil Pipe Institute recommendation. Joints shall be made with neoprene gaskets and stainless

steel clamp and shield assemblies listed by NSF International as compliant with CISPI 310. Sealing sleeve shall be polychloroprene (neoprene) based rubber sleeve conforming to ASTM C564.

- b). Hubless Cast Iron Soil Pipe and Fittings
 - i. Hubless pipe and fittings must be listed by NSF International as compliant with CISPI 301.
 - ii. Manufacturers:
 - 1) AB&I
 - 2) Charlotte
 - 3) Tyler

- c). Medium Duty Shielding Coupling, ASTM C 1540, Type 304 Stainless Steel corrugated shield and bands, and polychloroprene (neoprene) based rubber sleeve conforming to ASTM C564.
 - i. Approved manufacturers:
 - 1) Clamp-All
 - 2) Mission Rubber Company
 - 3) Anaco

3. Domestic Hot and Cold Water Piping Inside Buildings, Above Grade:

- a). Pipe or Tubing: 2 inches & smaller, all water lines soft temper Type *K* copper tubing below ground, hard temper Type *L* copper tubing above ground, ASTM B88.

Provide dielectric fittings between steel and copper. Victaulic Style 47 or approved equal.

- b). Fittings & Joints: Copper tubing fittings and joints shall be solder type wrought copper - 95-5 silver solder or braze (lead and antimony based solders are prohibited).

- c). Gate Valves:

2 inches & smaller - bronze solder end, bronze body, solid wedge, rising stem, 200 lb. w.o.g. non-shock. However, use brass valves only on all copper pipe.

- d). Ball Valves: Shut-off valves 2-inches and smaller shall be ball valves. Ball valves shall be 150 lbs, brass or bronze body, standard port, 2 piece body, TFE seats with bronze trim. Ball valves shall be threaded end or solder end, or Vic-Press end as required to accommodate piping. Ball valves shall be as manufactured by Victaulic, Conbraco, Crane, Apollo, Nibco, Watts or engineer approved equal.

- e). Unions:

2 inches & smaller - wrought copper, ground joint solder ends;

- f). Extended Valve Stems: Provide and install round collar type extended valve stems on all valves installed in insulated piping. Valve stem and collar shall be selected to suit insulation thickness and maintain valve handles outside of insulation.

B. Copper pipe shall be Revere, Anaconda or Chase with approved solder fittings.

2.2. PIPE HANGERS

- A. All hangers for metallic piping shall be adjustable, wrought clevis type, or adjustable malleable split ring swivel type, having rods with machine threads. Hangers shall be Grinnell Company's Figure 260 for pipe 3/4-inch and larger, and Figure 65 for pipe 2-inches and smaller, or approved equal. For copper piping in direct contact with the hanger, hanger construction shall be copper coated to prevent contact of dissimilar metals similar to Grinnell's Figure CT-65. Hanger spacing and rod sizes for steel and copper pipe shall not be less than the following:

NOMINAL PIPE SIZE IN	MAXIMUM SPAN FT. COPPER TUBE	MINIMUM ROD DIAMETER INCHES OF ASTM A36 STEEL THREADED RODS
3/4 & 1	5	3/8
1 - 1/2	8	3/8
2	8	3/8

- B. Install hangers for cast-iron piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 - 2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
 - 3. PS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
 - 4. Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).
- C. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).
- D. Hangers for pipe sizes 1/2 to 1 1/2 inch (13 to 38 mm): Carbon steel, adjustable swivel, split ring.
- E. Hangers for cold pipe sizes 2 inches (50 mm) and over: Carbon steel, adjustable, clevis.
- F. Multiple or Trapeze hangers: Steel channels with welded spacers and hanger rods.
- G. Wall support for pipe sizes to 3 inches (76 mm): cast iron hook
- H. Wall support for pipe sizes 4 inches (100 mm) and over: Welded steel bracket and wrought steel clamp.

- I. Vertical Support: Steel riser clamp.
- J. Copper pipe support: Carbon steel ring, adjustable, copper plated.
- K. Hanger rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- L. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.3. VALVES

- A. Provide parts list and assembly drawings (exploded view) for all valves in shop drawing submittals. Provide valves of the same type by the same manufacturer.

2.4. UNIONS, FLANGES, AND COUPLINGS

- A. Unions in copper pipe 2-inches and smaller shall be sweat fittings with bronze seats designed for a working pressure of 125 psig.

2.5. ESCUTCHEONS

- A. Provide stainless steel escutcheons properly fitted and secured with set screws on all exposed piping which passes through walls, floors or ceilings of finished spaces.
- B. All escutcheon plates shall be stainless steel of plain pattern, and shall be set tight on the pipe and to the building surface. Plastic escutcheon plates will not be accepted.

2.6. SLEEVES

- A. Sleeves shall be provided around all pipes through walls, floors, ceilings, partitions, roof structure members or other building parts. Sleeves shall be standard weight galvanized iron pipe two sizes larger than the pipe or insulation so that pipe or insulation shall pass through masonry or concrete walls or floors. Provide 20 gauge galvanized steel sheet or galvanized pipe sleeves for all piping passing through frame walls.
- B. Sleeves through floors shall be flush with the floor except for sleeves passing through Equipment Rooms which shall extend $\frac{3}{4}$ -inch above the floor. Space between the pipe and sleeve shall be caulked. Escutcheon plates shall be constructed to conceal the ends of sleeves. Each trade shall be responsible for drilling existing floors and walls for necessary sleeve holes. Drilling methods and tools shall be as hereinbefore specified.
- C. Sleeves through walls and floors shall be sealed with a waterproof caulking compound.
- D. Firestop at sleeves that penetrate smoke barriers smoke partitions and/or rated walls/floors.

PART 3. EXECUTION

3.1. GENERAL PIPING INSTALLATION REQUIREMENTS

- A. All pipes shall be cut accurately to measurements established at the building, and shall be worked into place without springing or forcing, properly clearing all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted. All pipes shall be so installed as to permit free expansion and contraction without causing damage. All open ends of pipe lines, equipment, etc., shall be properly capped or plugged during installation to keep dirt or other foreign material out of the system. All pipes shall be run parallel with the lines of the building and as close to walls, columns and ceilings as may be practical, with proper pitch. All piping shall be arranged so as not to interfere with removal of other equipment on devices not to block access to doors, windows, manholes, or other access openings. Flanges or unions, as applicable for the type of piping specified, shall be provided in the piping at connections to all items of equipment, coils, etc., and installed so that there will be no interference with the installation of the equipment, ducts, etc. All valves and specialties shall be placed to permit easy operation and access and all valves shall be regulated, packed and glands adjusted at the completion of the work before final acceptance. All piping shall be installed so as to avoid air or liquid pockets throughout the work. Ends of pipe shall be reamed so as to remove all burrs.
- B. All piping shall be graded to convey entrained air to high points where automatic air vents shall be provided. The size of supply and return pipes for each piece of equipment shall in no case be smaller than the outlets in the equipment.
- C. All piping shall be run to provide a minimum clearance of 2-inches between finished covering on such piping and all adjacent work. Group piping wherever practical at common elevations.
- D. All valves, strainers, caps, and other fittings shall be readily accessible.
- E. Rough-in and final connections are required to all equipment and fixtures provided under this Contract.
- F. All branches from water mains shall be taken from the top of the supply mains at an angle of forty-five (45) degrees above the horizontal, unless otherwise directed. Branches feeding down shall be taken from the side or bottom of the main on water mains only. All connections shall be carefully made to insure unrestricted circulation, eliminate air pockets or trapped condensate, and permit the complete drainage of the system.
- G. Cutoff valves shall be provided on each branch line from the mains on all plumbing lines.
- H. Shut-off valves shall be installed at the inlet and outlet of each piece of equipment to permit isolation for maintenance and repair.
- I. Spring clamp plates (escutcheons) shall be provided where pipes are exposed in the building and run through walls, floors, or ceilings. Plates shall be stainless steel of plain pattern, and shall be set tight on the pipe and to the building surface.
- J. If the size of any piping is not clearly evident in the drawings, the Contractor shall request instructions for the Engineer as to the proper sizing. Any changes resulting from the Contractor's failure to request clarification shall be at his expense. Where pipe size

discrepancies or conflicts exist in the drawings, the larger pipe size shall govern.

- K. Install all valves with stem upright or horizontal, not inverted.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, weld and apply one coat of zinc rich primer.
- M. Provide clearance for installation of insulation and access to valves and fittings.
- N. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.2. VALVE INSTALLATION REQUIREMENTS

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Do not attempt to repair defective valves; replace with new valves.
- F. Install valves as indicated, according to manufacturer's written instructions.
- G. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- H. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- I. Locate valves for easy access and provide separate support where necessary.
- J. Install valves in horizontal piping with stem at or above the center of the pipe.
- K. Install valves in a position to allow full stem movement.
- L. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

3.3. WASTE AND VENT PIPING INSTALLATION REQUIREMENTS

- A. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. All

pipe when laid shall rest on the full length of the barrel and bell holes shall be dug in trench bottoms to make joints. Pipe shall not be adjusted to grade by use of block or wedges. Where rock or old foundations are encountered, trenches shall be excavated 6-inches below grade and crusher run limestone shall be used as a bedding material to support barrel of pipe.

- B. As the work progresses, the interior of the sewer shall be cleared of all dirt and superfluous materials of every description.
- C. Trenches shall be kept free from water until the pipe jointing material has set and pipe shall not be laid when the conditions of the trench or the weather is unsuitable for such work. At all times, when work is not in progress, all open ends of pipe and fittings shall be securely closed to the satisfaction of the Engineer, so that no trench water, earth or other substance will enter the pipe or fittings.
- D. Slip joints will be permitted only in trap seals or on the inlet side of the trap. Unions on the sewer side of the trap shall be ground faced, and shall not be concealed or enclosed. Install bell and spigot pipe with bell end upstream.
- E. Threaded joints shall be American Standard taper screw threads with permacel joint compound applied to the male thread. Connections between threaded pipe and cast iron pipe shall have a ring or half coupling screwed on to form a spigot end on the threaded pipe.
- F. Establish invert elevations, slopes for drainage to 1/8 inch per foot. Maintain gradients.

3.4. PIPE JOINTS INSTALLATION REQUIREMENTS

- A. **Screwed Joints:** All screwed joints shall be made with tapered threads properly cut. Screwed joints shall be made perfectly tight with a stiff mixture of graphite and oil, applied with a brush to the male threads on the fittings.
- B. **Soldered Joints and Copper Piping:** Joints in copper piping shall conform to the following minimum standards.
 - 1. The pipes shall be cut to a length making certain that the ends are square, using a fine hacksaw blade or tube cutter. The ends of all pipes shall be reamed and all burrs removed.
 - 2. The outside end of the pipe and the cut end of the fitting shall be cleaned with steel wool, sand cloth, or steel wire brush. All dark spots shall be removed.
 - 3. The flux shall be applied evenly and sparingly to the outside end of the pipe and the inside of the outer end of the fitting until all surfaces to be jointed are completely covered. The piping and fitting shall be slipped together and reworked several times to insure an even distribution of the flux.
 - 4. The correct amount of solder per joint for each size pipe shall be used in accordance with the manufacturer's recommendations.
 - 5. Solder joints shall be made by using a direct flame from a torch.

6. On pipe sizes larger than 1/4-inch, the fittings and valves in the pipe shall be moved or tapped with a hammer when the solder starts to melt to insure an even distribution of the solder.
 7. The excess solder shall be removed while it is still in the plastic state leaving a fillet around the cup of the fitting.
 8. Solder joints shall be suitable for working pressure of 100 psig and for working temperature of not less than 250 degrees F. The type of solder and flux used will be submitted for approval. Type 95-5 shall be the minimum standard.
 9. Lead and antimony-based solders shall not be used for potable water systems. Brazing and silver solders are acceptable.
- C. Prohibited Connections: No direct weld, soldered, or brazed connections, without unions or flanges, shall be made to valves, strainers, apparatus, or related equipment. Right and left couplings, long threads, or caulking of pipe threads or gasket joints will not be permitted.
- D. Mechanical specification for mechanical joint for cast iron pressure pipe & fittings, ANSI A21.11.

3.5. HANGERS AND SUPPORTS INSTALLATION REQUIREMENTS

- A. General: All hangers shall be of an approved type arranged to maintain the required grading and pitching of lines to prevent vibration and to provide for expansion and contraction. Provide protection saddles between hangers and insulation on heating water insulated pipe. Saddles shall be Grinnells Figure 173/273 or approved equal. Provide approved spacers between saddles and pipe where flexible insulation is specified. Provide insulation protection shields for insulated piping without saddles. Shield shall be Grinnell Figure 167 or as approved equal.
- B. Spacing: Regardless of spacing, hangers shall be provided at or near all changes in direction, both vertical and horizontal, for all piping. For cast iron soil pipe, one hanger shall be placed at each hub or bell.
- C. Vertical Lines: Shall be supported at their bases, using either a suitable hanger placed in a horizontal line near the riser, or a base type fitting set on a pedestal, foundation or support. Riser clamp shall be Grinnell Co.'s Figure 261, or approved equal.
- D. Racks and Brackets: All horizontal piping on vertical walls shall be properly supported by suitable racks securely anchored into the wall construction. Where not practical to obtain ceiling anchorage, all piping near walls shall be supported by approved brackets securely anchored into the wall construction. Washer plates (Fib. 60, 60L) and other miscellaneous attachments, fasteners, etc., shall be Grinnell or as approved equal. All exterior hanger and bracket systems in their entirety shall be galvanized.
- E. Pipe Hangers and supports shall be attached to the panel point at the top chord of bar joist or at a location approved by the structural engineer.
- F. Select hangers and components for loads imposed. Secure rods with double nuts.

- G. Support of horizontal piping shall allow for vertical adjustment after installation of piping.
- H. Support overhead piping with clevis hangers.
- I. Do not support all parallel piping from the same joist. Stagger all supports in accordance with the structural engineer's recommendations.

3.6. PIPING IDENTIFICATION INSTALLATION

- A. All piping shall be identified with painted background marked with the name of the service with arrows to indicate flow direction. Color code and system identification shall comply with ANSI Standards and piping identification system shall comply with ASME A13.1-81., scheme for the identification of piping systems and ASHRAE Fundamentals Handbook, latest edition.
- B. Markings shall be plain block letters, stenciled on pipes, and shall be located near each branch connection, near each valve, and at least every 10 feet on straight runs of pipe. Where pipes are adjacent to each other, markings shall be neatly lined up. All markings shall be located in such manner as to be easily legible from the floor. Pipe identification schedule shall be as follows:

OUTSIDE DIAMETER OF PIPE OR COVERING (INCHES)	LENGTH OF COLOR FIELD (INCHES)	SIZE OF LETTERS (INCHES)
½ to 1 ¼	8	½
1-½ to 2	8	¾
2 ½ to 6	12	1 ¼
8 to 10	24	2 ½
Over 10	32	3 ½

3.7. CLEANING PIPING AND EQUIPMENT

- A. All plumbing piping, systems shall be cleaned by filling with a solution of one (1) pound of trisodium phosphate to each 50 gallons of water and circulating this solution for a period of six (6) hours during which time the system shall reach operating temperature. The systems shall then be flushed with fresh water and refilled with fresh water purged of all air.
- B. All plumbing, piping system shall be flushed clean with fresh water. See Division 22 Sections, *Plumbing Fixtures* and *Plumbing Equipment* for domestic potable water cleaning and sterilization.

END OF SECTION

**DIVISION 22 SECTION 22 07 01
PLUMBING INSULATION**

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CANNOT BE USED FOR BIDDING.

SECTION 22 07 01 - PLUMBING INSULATION

PART 1. GENERAL

1.1. REFERENCE

- A. The Conditions of the Contract and other General Requirements apply to the work specified in this Section. All work under this Section shall be subject to the requirements of Division 22 Section, *Common Work Results for Plumbing*.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2. DESCRIPTION

- A. All piping and equipment installed under this Contract shall be covered as specified.

1.3. SCOPE

- A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct fabrication and installation of thermal insulation applied to all piping, equipment, and systems, in accordance with applicable project specifications and drawings, subject to the terms and conditions of the contract.

1.4. STANDARDS

- A. Thermal insulation materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or use:
 - 1. American Society for Testing of Materials Specifications:
 - a). ASTM C 547, "Standard Specification for Mineral Fiber Preformed Pipe Insulation".
 - b). ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Materials".
 - c). ASTM C 585, "Recommended Practice for Inner and Outer Diameters of Rigid Pipe Insulation for Nominal Sizes of Pipe and Tubing (NPS System)".
 - d). ASTM C 1136, "Standard Specification for Barrier Material, Vapor, "Type 1 or 2 (Jacket only).
- B. Insulation materials, including all weather and vapor barrier materials, closures, hangers, supports, fitting covers, and other accessories, shall be furnished and installed in strict accordance with project drawings, plans, and specifications.

1.5. SYSTEM PERFORMANCE

- A. Insulation materials furnished and installed hereunder should meet the minimum economic insulation thickness requirements of the North American Insulation Manufacturers' Association (NAIMA) (formerly known as TIMA), to ensure cost-effective energy conservation performance. Alternatively, materials should meet the minimum thickness requirements of National Voluntary Consensus Standard 90.1, (latest edition) and "Energy Efficient Design of New Buildings," of the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), latest edition. However, if other factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor. As minimum, all insulation thicknesses shall be as hereinafter specified.
- B. Insulation materials furnished and installed hereunder shall meet the fire hazard requirements of any one of the following specifications:
1. American Society for Testing of Materials ASTM E 84
 2. Underwriters' Laboratories, Inc. UL 723
 3. National Fire Protection Association NFPA 255

1.6. QUALITY ASSURANCE

- A. Insulation materials and accessories furnished and installed hereunder shall, where required, be accompanied by manufacturers' current submittal or data sheets showing compliance with applicable specifications listed in Section 1.4 above.
- B. Insulation materials and accessories shall be installed in a workmanlike manner by skilled and experienced workers who are regularly engaged in commercial insulation work.

1.7. DELIVERY AND STORAGE OF MATERIALS

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The Contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The Contractor shall also use all means necessary to protect work and materials installed by other trades.
- C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the Contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the Contractor is able to demonstrate that wet insulation when fully dried out (either before installation, or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer in writing for technical assistance.

- D. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements. Protect all insulation from water, construction traffic, dirt, chemical and mechanical damage.

PART 2. PRODUCTS

2.1. GENERAL

- A. All materials to be insulated shall be thoroughly cleaned, after completion of successful tests, and shall be covered as specified below. Fiberglass insulation shall be Owens-Corning, Manville, Armstrong, or P.P.G, or as approved equal.

2.2. PIPE INSULATION MATERIALS

- A. Unless otherwise noted, insulation shall be one piece or half sectional molded fibrous glass with "K" rating of .23 at 75 degrees F mean temperature, for service temperatures between -60 degrees F and +450 degrees F with all service jacket. Pipe insulation shall be fiberglass SSL II with double closure system as manufactured by Owens Corning, Johns Manville, Knauf or approved equal.
- B. Unless otherwise noted, pipe insulation jacket shall be factory-applied vinyl coated, embossed and reinforced vapor barrier laminate, with a perm rating of not more than 0.02 perms. All hot and cold, concealed and exposed butt strips shall be of the same material as the jacket. Jacket and butt strips shall be sealed with field-applied Foster 85-20/85-50 or Childers CP-82 (5 gallon cans only) adhesive. Jacket and butt strips shall be off-white color and shall be equivalent to Owens-Corning Fiberglass 25-ASJ.
- C. For fittings on all piping, valves, and flanges, apply fiberglass molded or segmented insulation equal in thickness to the adjoining insulation and securely fasten in place using wire. Cold piping: Apply a tack coat of vapor barrier coating and reinforcing mesh. After ½ hour, apply second coat of same vapor barrier coating, UL labeled, Type C, for cold water piping. Hot piping Type H for hot water piping: Apply tack of breather mastic. Wrap fitting with fiberglass reinforcing cloth overlapping adjoining sections of pipe insulation by 2-inches. Apply a second coat of breather mastic over the reinforcing cloth, working it to a smooth finish. As an option to the above hot fittings, a polyvinyl chloride fitting cover may be supplied.
- D. All pipe insulation, jackets, or facings, and adhesives used to adhere jacket or facing to the insulation, including fittings and butt strips, shall have non-combustible fire and smoke hazard system rating and label as tested by ASTM E-84, NFPA 225, and UL 73, not exceeding Flame Spread 25, Fuel Contributed 50, Smoke Developed 50. Accessories such as adhesives, mastic cements, tapes and cloth for fittings shall have the same ratings as listed above. All products or their shipping cartons shall bear the Underwriter's label indicating that flame and smoke ratings do not exceed the above criteria.
- E. For piping having a vapor barrier insulation and for all insulated piping requiring supports, hangers and supports shall be installed outside the insulation. Wherever hangers and supports are installed outside the insulation, pipe insulation protecting shields shall be provided. Where insulation is a load bearing material, of sufficient strength to support the weight of the piping, pipe shields one-third the circumference of the insulation and of a

length not less than three times the diameter of the insulation (maximum length 24-inches) shall be provided. Insulation of 7-1/4 pound or greater density will be considered as load bearing for pipe sizes up to and including 2-inches. Where insulation is not of sufficient strength to support the weight of the piping, a half section of high density fiberglass or foam inserts, shall be provided. Vapor barrier and finish shall be applied as required to match adjoining insulation. In addition, shields shall be furnished as specified above.

- F. All disturbed piping insulation in existing areas shall be re-insulated with insulation type, density, and thickness as specified for new piping. Insulation damaged due to new work and demolition only shall be replaced unless otherwise noted.
- G. On cold systems such as domestic cold water, vapor barrier performance is extremely important. All penetrations and seams of the ASJ and exposed ends of insulation must be sealed with vapor barrier coating. The ASJ must be protected with either a vapor barrier coating or a suitable vapor retarding outer jacket. Vapor seals at butt joints shall be applied at every fourth pipe section joint and at each fitting to provide isolation of water incursion. Vapor Barrier Coating: Foster 30-65; Childers CP-34 or Vimasco 749. Permeance shall be 0.03 perms or less at 45 mils dry at test by ASTM E96.
- H. Fittings and valves shall be insulated with pre-formed fiberglass fittings, fabricated sections of Fiberglass pipe insulation, Fiberglass pipe and tank insulation, Fiberglass blanket insulation, or insulating cement. Thickness shall be equal to adjacent pipe insulation. Finish shall be with pre-formed PVC fitting covers or as otherwise specified on contract drawings.
 - 1. Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section sized to provide the same insulation thickness as on the main pipe section. An oversized insulation section shall be used to form a collar between the two insulation sections with low density blanket insulation being used to fill gaps. Jacketing shall match that used on straight pipe sections. Rough cut ends shall be coated with a suitable weather or vapor-resistant mastic as dictated by the system location and service. Finish valve installation with a Tyvac jacket with ends that secure to adjacent piping.
 - 2. On hot systems where fittings are to be left exposed, insulation ends should be beveled away from bolts for easy access.
 - 3. On cold systems, particular care must be given to vapor sealing the fitting cover or finish to the pipe insulation vapor barrier. All valve stems must be sealed with caulking which allows free movement of the stem but provides a seal against moisture incursion. All gauge and thermometer penetrations and extensions shall be correctly sealed and insulated to prevent surface condensation.
- I. All piping shall be supported in such a manner that neither the insulation or the vapor/weather barrier is compromised by the hanger or the effects of the hanger. In all cases, hanger spacing must be such that the circumferential joint may be made outside the hanger. On cold systems, vapor barrier must be continuous, including material covered by the hanger saddle.
 - 1. Piping systems 3-inches (7.5cm) in diameter or less, insulated with Fiberglass insulation, may be supported by placing saddles of the proper length and spacing, as

designated in Owens-Corning Pub. 1-IN-12534, under the insulation. Hangers saddles shall be minimum 16 gauge with a saddle arc of 120 degrees minimum.

2. Thermal expansion and contraction of the piping and insulation system shall generally be taken care of by utilizing double layers of insulation and staggering both longitudinal and circumferential joints. Where long runs are encountered, expansion joints may be required where single layers of insulation are being used and should be so noted on the contract drawings.
3. On vertical runs, insulation support rings shall be used.

2.3. PIPING INSULATION THICKNESSES SCHEDULE

- A. All piping shall be insulated with pipe insulation of the thicknesses indicted below:

PIPING INSULATION THICKNESS SCHEDULE SERVICES	THICKNESS
All Domestic Hot and Cold Water Piping	1-inch thickness

2.4. ACCESSORY MATERIALS

- A. Accessory materials installed as part of insulation work under this section shall include, but not be limited to:
1. Closure Materials - Butt strips, bands, wires, staples, mastics, adhesives; pressure-sensitive tapes.
 2. Field-applied jacketing materials - sheet metal, plastic, canvas, fiber glass cloth, insulating cement; PVC fitting covers, PVC jacketing.
 3. Support Materials - Hanger straps, hanger rods, saddles.
 4. Fasteners, weld pins/studs, speed clips, insulation washers.
- B. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of the Midwest Insulation Contractors Association (MICA) "Commercial & Industrial Insulation Standards."

2.5. FIELD-APPLIED JACKET

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, 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. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a). Johns Manville; Zeston.
 - b). P.I.C. Plastics, Inc.; FG Series.
 - c). Proto PVC Corporation; LoSmoke.
 - d). Speedline Corporation; SmokeSafe.
2. Adhesive: As recommended by jacket material manufacturer. VOC content not to exceed 250 g/L.
 3. Color: High Gloss White
 4. 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.

PART 3. EXECUTION

3.1. WORKMANSHIP

- A. The Contractor shall take special care to prevent soiling equipment below or adjacent to areas being insulated. He shall be completely responsible for removing insulation cement splashes and smears and all surfaces that he mars or otherwise soils or defaces, and he will be totally responsible for restoring these damaged surfaces to their like-new condition when delivered to the site.

3.2. SITE INSPECTION

- A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.
- B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.3. PREPARATION

- A. Ensure that all pipe and equipment surfaces over which insulation is to be installed are clean and dry.
- B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.

- C. Ensure that pressure testing of piping systems has been completed prior to installing insulation.

3.4. INSTALLATION

A. Piping Systems

1. General:

- a). Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices to ensure that it will serve its intended purpose.
- b). Install insulation on piping subsequent to installation of heat tracing, painting, testing, and acceptance tests.
- c). Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.
- d). Maintain the integrity of factory-applied vapor barrier jacketing on all pipe insulation, protecting it against puncture, tear or other damage. Seal all tears, punctures and other penetrations of the pipe insulation vapor barrier coating.
- e). On exposed piping, locate insulation and cover seams in least visible location.

2. Fittings: Cover valves, fittings, unions, flanges, strainers, flexible connections, expansion joints, pump bodies, strainers, blowdowns, backflow preventers, autoflow valves and similar items in each piping system using one of the following:

- a). Mitered sections of insulation equivalent in thickness and composition to that installed on straight pipe runs.
- b). Insulation cement equal in thickness to the adjoining insulation.
- c). PVC fitting covers insulated with material equal in thickness and composition to adjoining insulation.

3. Penetrations: Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise specified.

4. Joints:

- a). Butt pipe insulation against hanger inserts. For hot pipes, apply 3-inch (7.5cm) wide vapor barrier tape or bank over butt joints. For cold piping,

apply wet coat of vapor barrier lap cement on butt joints, and seal joints with 3-inch (7.5cm) wide vapor barrier tape or band.

- b). All pipe insulation ends shall be tapered and sealed, regardless of service.

3.5. FIELD QUALITY ASSURANCE

- A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

3.6. PROTECTION

- A. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.
- B. The insulation contractor shall advise the general and/or the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

3.7. SAFETY PRECAUTIONS

- A. Insulation contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.
- B. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

3.8. INSULATION COVERING

- A. Unless otherwise noted, all exposed pipe insulation required to be insulated shall be jacketed with a PVC Jacketing with fitting covers. PVC jacket shall be color fade resistant, white high gloss, U.S.D.A. authorized as manufactured by Proto Corporation or approved equal. PVC jacketing shall be high impact, ultraviolet resistant PVC. Minimum thickness shall be 20 mils, roll stock ready for shop or field cutting and forming.
- B. Where PVC jackets are indicated, install with 1 inch overlap at longitudinal seams and end joints, for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturers 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.

END OF SECTION

**DIVISION 22 SECTION 22 40 00
PLUMBING FIXTURES**

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CANNOT BE USED FOR BIDDING.

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1. GENERAL

1.1. GENERAL

- A. For General Mechanical Requirements, see Division 22 Section, *Common Work Results for Plumbing & Division 01, General Requirements*.
- B. Drawings and general provisions of the Contract, including *General and Supplementary Conditions* and Division 01 specifications apply to this Section.
- C. All exposed bolts, screws, etc., shall be vandal proof.
- D. All plumbing materials, equipment and fixtures shall be new and of best grade, free of defects and complete with all required appurtenances and accessories.
- E. Piping and insulation are specified under other sections.
- F. Use "Sani-Sett" setting compound for fixtures.
- G. Provide all materials, equipment and perform all labor required to install plumbing system complete as specified, as drawings indicated and as required by the State of Delaware, National Standard Plumbing Code and International Plumbing Code, local code, and all other authorities have jurisdiction. Comply with the current lead free laws per the requirements of the state in which the project is being constructed.
- H. Provide stops for all plumbing fixtures and equipment. Stops are to be accessible.
- I. Provide P traps on fixtures for which traps have not been included as part of furnished equipment. Trap size to equal size of fixture tailpiece.
- J. All exposed metal parts of fixtures shall be chromium plated brass. Piping, fittings, valves, traps and accessories including escutcheons for piping shall be chromium plated where exposed in finished areas.
- K. All faucets for kitchen sinks, and lavatories shall be listed for drinking-water or commercial applications by the National Sanitation Foundation (NSF) or Underwriters Laboratory (U.L.). All required faucets shall comply with NSF Standard 61 for both lead content and leaching rate. Submit documentation indicating compliance for all required faucets.
- L. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
 - 1. American Gas Association (AGA).
 - 2. National Sanitation Foundation (NSF).
 - 3. American Society of Mechanical Engineers (ASME).
 - 4. National Electrical Manufacturers' Association (NEMA).
 - 5. Underwriters Laboratories (UL).

1.2. REFERENCES

- A. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
- B. ANSI/ASMI A112.19.2 - Vitreous China Plumbing Fixtures.
- C. ANSI/ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
- D. ANSI/NFPA 70 - National Electrical Code.
- E. IBC - International Building Code

1.3. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01, Section *General Requirements*.
- B. Accept fixtures on site in factory packaging. Inspect for damage.
- C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.4. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings and per the manufacturer.
- B. Confirm that millwork is constructed with adequate provisions for the installation of counter top lavatories and sinks.

1.5. EXTRA MATERIALS

- A. Provide two sets of faucet washers and flush valve service kits to the Owner. Provide correspondence to Engineer that extra materials have been turned over to the Owner.

1.6. GRAB BAR COORDINATION

- A. For handicapped plumbing fixtures coordinate location of flush valves with grab bars prior to installation.

PART 2. PRODUCTS

2.1. PLUMBING FIXTURES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 1. Water Closets, Urinals and Lavatories: Kohler, Crane, American Standard, Sloan, Zurn.
 - 2. Water Closet Seats: Kohler, Church, Comfort Seats, Bemis.
 - 3. Faucets: Chicago Faucet, Kohler, Delta, Speakman, Symmons, T&S Brass, Zurn, Moen

4. Drains: Chicago Faucet, Engineered Brass Co., Kohler, McGuire
5. Stops & Supplies: Chicago Faucet, T&S Brass, McGuire, Brass Craft
6. Flush Valves: Sloan, Delany, Zurn, Toto
7. Traps: Kohler, McGuire, Dearborn, Engineered Brass Co. (17 gauge min.)
8. Carriers & Supports: Zurn, Josam, J. R. Smith, Mifab, Watts
9. Sinks: Elkay, Just, American Standard
10. Aerators/Shower Heads: Bricor, Neoperl, Omni Flow Controls

B. P-1

1. Watercloset (Handicapped): (floor mounted, flush valve) Floor mounted, flush valve (handicapped); Kohler Model K-4368 "Highcliff", American Standard 3461, lite toilet. Toilet, vitreous china, elongated bowl design, siphon jet flushing, floor mounted with bolt caps, seat, carrier, supplies and stops.
2. Flushometer: Sloan, Delany, Zurn or approved equal, low consumption (1.6 GPF), exposed diaphragm type, chrome plated brass closet flushometer. Unit shall include the following features and accessories: ADA compliant non-hold open handle, 1-inch I.P.S. screwdriver back check angle stop, spud coupling and flange for 1 ½ - inches top spud, adjustable tail piece, vacuum breaker flush connection, sweat solder adapter with cover tube and wall flange. Supply with Sloan Model J-212-A split ring wall support. Maximum height to top of flush valve shall be 16 inches.
3. Seat: Kohler Model K4670-C, American Standard 5901.100 solid plastic white seat with open front and check hinge.
4. ADA: Fixture rim shall be mounted 17-inches inches above finished floor. Unit and installation shall comply with the American Disabilities Act Guidelines (ADA) and ANSI A11 7.1 requirement for people with disabilities.

C. P-2

1. Lavatory (Handicapped): (wall hung) (deck mount) faucet, Kohler Model K-2032 Greenwich, American Standard Lucerne 0355.012, wall mount lavatory, vitreous china with 20-inch x 18 bowl, and 4-inch faucet centers. Provide concealed arm Carrier. Lavatory mounting height to be 34-inches above finished floor.
2. Faucets: Chicago Faucet 802-A317ABCP , American Standard 5500.170, deck mounted lavatory faucets with wrist blade handles, low-flow (.375 gpm) outlet, polished chrome finish. Unit shall operate in either direction at less than 5 lbs push at 80 psi water pressure. Certification to comply with ADA shall be furnished.
3. Strainer: Chicago Faucet Model 327A, American Standard 2411.015, with 1-1/4-inch tailpiece, non removable brass strainer, grid strainer waste, chrome plated finished.
4. P-Trap: Cast Brass 1-1/4-inch "P" trap. Unit shall be offset drain assembly with under lavatory insulation.
5. Stops: Chicago Faucet Model I005ABCP valve stops with 3/8-inch loose key cap

and removable tee handle, wall flange, chrome plated finished. All piping to be insulated with under lavatory insulation.

6. Insulation: See this Section.
7. Thermostatic Mixing Valves: Provide and install below fixture. See Part 2 "Thermostatic Mixing Valves".
8. Carrier: Zurn, Josam, or Watts cast iron and steel carrier. ANSI/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.

D. P-3

1. Sink: (Kitchen sink, 10-inch deep bowl) (Single Bowl) Elkay Model DLR221910, Just SLX1921AGR deep single bowl sink. Unit shall be manufactured of 18 gauge, type 302 stainless steel with fully coated underside. Sinks shall be counter mounted complete with 8-inch faucet centers with 10-inch deep bowl.
2. Faucets: Chicago Faucet Model 786-E3AECF Deck mounted lavatory faucet with GN2A swing/rigid gooseneck spout with low flow (1.25 gallons per minute) aerator and Model 317 wrist blade handles. Faucets shall be 8-inches on center with chrome plated finish.
3. Strainer: Jomar Model SS-306 Snap-N-Loc, or Just J-35 basket strainer and brass locknut and tailnut. Deep cup body and basket shall be 300 series stainless steel. Provide 1-1/2 tailpiece.
4. P-Trap: Cast Brass 1-1/2 "P" trap.
5. Stops: Chicago Faucets Model 1005ABCP valve stops with riser supply 3/8 Loose key cap and removable tee handle, wall flange, chrome plate finish.

2.2. THERMOSTATIC MIXING VALVES (INDIVIDUAL FIXTURE TYPE)

- A. Furnish and install thermostatic mixing valves where indicated at public lavatories.
- B. Thermostatic mixing valves shall be Bradley S59-4000A, Watts, or approved equal for installation under lavs. Provide in-line check valves, lead free body, escutcheon plates, inlet filters, and insulation as required. Thermostatic mixing valves shall be adjusted to deliver 105 degrees Fahrenheit hot water when supplied with 140 degrees Fahrenheit delivering hot water. Furnish with adjusting cap with locking feature.
- C. The thermostatic mixing valves shall be ASSE standard 1016-96, ASSE 1017, ASSE 1069, and ASSE 1070 listed.

2.3. PLUMBING FIXTURE SUPPORTS

- A. Support for lavatories, etc.:

1. Where fixtures are supported from concrete or cinder block walls, install No. 10 USSG Steel plate on the opposite side of the wall and bolt hangers or supports through plate. Where opposite side of wall is exposed to view, place bolts in core of blocks and fill core with cement.
2. Where lavatories with wall hangers have been specified and fixtures are supported from metal stud frame partitions, fixture brackets or mounting lugs shall be through bolted to steel channel crosspieces not less than 1-1/2-inch wide anchored to studs. Bolt heads shall be welded to channel web.
3. Concealed arm type lavatory supports, Josam 17100 with cast iron headers, box steel stanchions, block type cast iron feet and header; and chrome plated cast brass threaded escutcheons for slab type lavatories.

2.4. HANDICAPPED LAVATORY/SINK INSULATION

- A. All handicapped lavatories and sinks shall be provided with under counter pipe and trim insulation.
- B. Insulation shall be fully molded "P" trap and angle valve insulated Hand-I-Lav Guard, Truebro Model #101, 102, and 105 to suit.
- C. Insulation to meet ADA #4 19.4, ANSI A117.1, and International Plumbing Code.
- D. Self extinguishing ASTM D635 burn characteristics, thermal conductivity ASTM C177 K-Value ' 1.17.
- E. Insulation thickness to be minimum 2 inch.
- F. Where lav. Guards are provided insulation may be omitted.

PART 3. EXECUTION

3.1. GENERAL INSTALLATION REQUIREMENTS

- A. Install all equipment in accordance with manufacturer's instructions.
- B. Setting heights of lavatories, drinking fountains, etc., shall be as directed prior to installation and shall be coordinated with Architectural Contract Documents.
- C. Install floor mounted fixtures only after finished floor has been installed.
- D. Provide rubber concussion washers between vitreous china fixtures and supporting brackets.
- E. Protect chromium plated trim from corrosive solutions used to clean tile work.
- F. Provide white, silicone caulking where fixtures come in contact with walls and floors. Sealant shall be mildew resistant type in accordance with ANSI A-136.1.
- G. Install components plumb and level.

- H. Install and secure fixtures in place with wall supports, wall carriers and bolts.
- I. Solidly attach water closets to floor with lug screws. Lead flashing is not intended to hold fixture in place.
- J. Install flush valve handles on the open side of all ADA waterclosets in accordance with ANSI requirements.
- K. Fixtures shall be vitreous china unless otherwise noted.
- L. Flush valves shall be self-closing, non-hold open type with vacuum breaker and perform satisfactorily when subject to inlet water pressure varying from 15 to 75 psi. Flush valves shall be as specified, Sloan, Delaney, Zurn, Toto, or approved equal.
- M. Provide flexible risers and loose key stops for all lavatories and sinks. Provide 17 ga. chrome plated brass tail piece and trap with cleanout for all lavatories and sinks.
- N. Slopes and invert elevations of all interior piping shall be established before any piping is installed in order that proper slopes will be maintained. All piping shall be located and determined where to be run to avoid conflict with other trades.
- O. Unless otherwise noted, all plumbing piping shall be routed as high as possible to allow proper installation of ductwork, conduits, etc.
- P. Coordinate with Architectural Drawings before roughing in plumbing.
- Q. All openings in ceilings and plenum walls for plumbing shall be sealed air tight and protected with fire stop.
- R. See domestic water riser diagrams for location of valves, shock absorbers, etc.
- S. Make proper HW, CW, re-cir., waste, and vent connections to all fixtures and equipment even though all branch main, elbows and connections are not shown.
- T. Unless otherwise noted, sanitary waste piping shown is below floor and all other piping is overhead, above ceiling. Domestic hot, and cold water piping shall be installed between ceiling and attic insulation.
- U. Unless otherwise noted, horizontal sanitary piping shall be pitched 1 percent.
- V. Unless otherwise noted, all domestic water piping shall be installed on heated side of ceiling insulation.
- W. All piping and installation shall comply with all local and national plumbing codes. Test piping as required by plumbing code and authority having jurisdiction.
- X. For sizes of all domestic water piping see plumbing fixture schedule and domestic water riser diagrams.

- Y. For sizes of all sanitary and vent piping see plumbing fixture schedule and sanitary/vent riser diagrams.

3.2. PLUMBING SPECIALTY INSTALLATION REQUIREMENTS

- A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.
- B. Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.
- C. Secure supplies to supports or substrate.
- D. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve as appropriate is not indicated.
- E. Install water-supply stop valves in accessible locations.
- F. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- G. Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.

3.3. TESTING

- A. After plumbing fixtures are connected, all piping and fixtures shall be tested for operation and a smoke or peppermint test shall be made on all soil, waste and vent piping.
- B. After the building has been occupied and the various equipment is in actual use, the Contractor shall make an operating test of all equipment at a time directed by the Engineer to determine that all contract requirements are met.

3.4. CLEANING AND STERILIZATION

- A. After final testing for leaks, all potable water lines shall be thoroughly flushed, by plumbing contractor, to remove foreign material. Before placing the systems in service, sterilize the new water lines in accordance with local health department codes and at a minimum according to the following procedure:
 - 1. Through a 3/4-inch hose connection in each branch main and building main, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less than 200 ppm. Plumbing Contractor shall provide plumbing connections and power for pumping chlorine into system.
 - 2. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident.
 - 3. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 200 ppm chlorine, retain this water in the system for at least three (3) hours.

4. CAUTION: Over-concentration of chlorine and more than three (3) hours of retention may result in damage to piping system. It is not necessary to retain chlorine in any system for twenty-four hours to achieve sterilization. AWWA states that 200 ppm chlorine for three hours is sufficient.
5. At the end of the retention period, no less than 100 ppm of chlorine shall be present at the extreme end of the system.
6. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 ppm.
7. Obtain representative water sample from the system for analysis by an independent and recognized bacteriological laboratory.
8. If the sample tested for coliform organisms is negative, a letter and laboratory report shall be submitted by the service organization to the Contractor, certifying successful completion of the sterilization. Additionally, this report shall be forwarded to the Owner as well as be included in the O&M Manual.
9. If any samples tested indicate the presence of coliform organisms, the entire sterilization procedure shall be repeated.
10. Take precautions to avoid use of plumbing fixtures and domestic water systems during sterilization period. Place signs on all plumbing fixtures and outlets during sterilization period.

3.5. EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

3.6. PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.7. INTERFACE WITH OTHER PRODUCTS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.8. ADJUSTING

- A. Adjust stops, valves, for intended water flow rate to fixtures without splashing, noise, or overflow.

3.9. CLEANING

- A. At completion, clean plumbing fixtures and equipment. Polish all chrome plated faucets, accessories, equipment, and piping.

3.10. FIXTURE HEIGHTS

- A. Install fixtures to heights above finished floor as required by local Plumbing Code, Americans with Disabilities Act (A.D.A.), Authority Having Jurisdiction, and Architectural Contract Drawings. In the absence of a local code requirements, install fixtures to heights above finished floor as follows.
- B. Water Closet
 - 1. Handicapped 18 inches to top of seat.
- C. Lavatory
 - 1. Handicapped 34 inches to top of basin rim.
- D. Water Closet Flush Valves
 - 1. Standard 11 inches min above bowl rim.

END OF SECTION

CANNOT BE USED FOR BIDDING.

**DIVISION 22 SECTION 22 40 05
PLUMBING EQUIPMENT**

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CANNOT BE USED FOR BIDDING.

SECTION 22 40 05 - PLUMBING EQUIPMENT

PART 1. GENERAL

1.1. GENERAL

- A. For General Mechanical Requirements, see Division 22 Section, *Common Work Results for Plumbing* & Division 01, *General Requirements*.
- B. Drawings and general provisions of the Contract, including *General and Supplementary Conditions* and Division 01 specifications apply to this Section.
- C. All exposed bolts, screws, etc., shall be vandal proof.
- D. All plumbing materials and equipment shall be new and of best grade, free of defects and complete with all required appurtenances and accessories.
- E. Piping and insulation are specified under other sections.
- F. Provide all materials, equipment and perform all labor required to install plumbing system complete as specified, as drawings indicated and as required by the State of Delaware, National Standard Plumbing Code, International Plumbing Code, the local code, and all other authorities have jurisdiction.
- G. Provide stops for all plumbing equipment. Stops are to be accessible.
- H. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
 - 1. National Sanitation Foundation (NSF).
 - 2. American Society of Mechanical Engineers (ASME).
 - 3. National Electrical Manufacturers' Association (NEMA).
 - 4. Underwriters Laboratories (UL).

1.2. REFERENCES

- A. ANSI A112.26.1 - Water Hammer Arrestors.
- B. PDI WH-201 Water Hammer Arresters.
- C. IBC - International Building Code

1.3. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of General Requirements.
- B. Accept equipment on site in factory packaging. Inspect for damage.
- C. Protect installed equipment from damage by securing areas and by leaving factory packaging in place to protect equipment and prevent use.

1.4. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings and per the manufacturer.

PART 2. PRODUCTS

2.1. CLEANOUTS

- A. Provide cleanouts in sanitary drainage systems at ends of runs, at changes in direction, near the base of stacks, every 50 feet in horizontal runs, of 4-inch diameter or less, every 100 feet in horizontal runs over 4-inches, and where indicated.
- B. Cleanouts shall be full size of pipe up to 4-inches and shall be 4-inches for larger sizes. Where installed in finished floors inserts shall match adjacent floor construction.
- C. Materials and Approved Manufacturers: Josam, J.R. Smith, Zurn, Wade or Ancon, Mifab, Watts, equal to Josam numbers given below:

1.	<u>Concealed Piping</u>	<u>C.I. Pipe</u>
2.	<u>Unfinished Areas</u>	
3.	Floors	56070
4.	Walls	58790
5.	<u>Finished Areas - Floors</u>	
6.	Composition Tile	56000-12
7.	Ceramic Tile	56000
8.	Carpet	56070-14
9.	Carpet insert to match adjacent carpet in type, color and grade.	
10.	<u>Finished Areas - Walls</u>	
11.	Plaster/Dry Wall	58770
12.	Tile/CMU	58790

2.2. SHOCK ABSORBERS

- A. Provide shock absorbers equal to Josam Shokstops at all fast closing valves, at the top of all cold water risers, at each flush valve or battery of flush valves, and where indicated. Sizes and locations shall be in accordance with PDI Standard WH 201.
- B. Shock absorbers shall conform to ANSI A112.26.1, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psig working pressure.
- C. Approved Manufacturers: Josam, Wade, Zurn, J.R. Smith, Sioux Chief, Watts, or approved equal.

2.3. OIL INTERCEPTOR WITH INTEGRAL HOLDING TANK

- A. Furnish and install packaged oil interceptors with integral holding tanks of size, capacity, and dimensions as indicated on the contract drawings. Units shall be MiFab Series MI-O-HU, Rockford or approved equal.
- B. Units shall be constructed of sanitary Neutra-Rust coated inside and outside 10 gauge steel. Units shall include sediment bucket with perforated inlet, deep seal trap covered lid, security bolts, removable baffle assembly and cross bar, stainless steel calibrated orifice plate, adjustable automatic draw-off assembly, double vent connections on each side, steel coated non-skid heavy duty re-enforced rectangular lids. Furnish units with integral holding tank for temporary additional waste oil storage.
- C. Units shall be provided with the following additional accessories:
 - 1. Anchor flange and membrane clamp.
 - 2. Extensions as required to bring lids up to grade.
 - 3. Internal air relief bypass.

PART 3. EXECUTION

3.1. GENERAL INSTALLATION REQUIREMENTS

- A. Install all equipment in accordance with manufacturer's instructions.
- B. Install components plumb and level.
- C. Cleanouts in horizontal pipes shall be installed with wyes on long sweep quarter beds. Cleanouts punching water proofing membranes shall have flashing clamps. Cleanout access covers in dry wall or gypsum board shall be painted to match walls.
- D. Extend cleanouts to finish floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- E. Encase exterior cleanouts in concrete flush with grade.
- F. Slopes and invert elevations of all interior piping shall be established before any piping is installed in order that proper slopes will be maintained. All piping shall be located and determined where to be run to avoid conflict with other trades.
- G. Unless otherwise noted, all plumbing piping shall be routed as high as possible between bottom of roof joists and above ceiling to allow proper installation of piping, conduits, etc.
- H. Coordinate with Architectural Drawings before roughing in plumbing.
- I. All openings in ceilings and plenum walls for plumbing shall be sealed air tight and protected with fire stop.
- J. See domestic water riser diagrams for location of valves, shock absorbers, etc.

- K. Make proper HW, CW, waste, and vent connections to all equipment even though all branch main, elbows and connections are not shown.
- L. Unless otherwise noted, sanitary waste piping shown is below floor and all other piping is overhead, above ceiling.
- M. Unless otherwise noted, horizontal sanitary piping pitches shall be 1 percent.
- N. Unless otherwise noted, all domestic water piping shall be installed on heated side of ceiling insulation.
- O. All piping and installation shall comply with all local and national plumbing codes. Test piping as required by plumbing code and authority having jurisdiction.
- P. For sizes of all domestic water piping see plumbing fixture schedule and domestic water riser diagrams.
- Q. For sizes of all sanitary and vent piping see plumbing fixture schedule and sanitary/vent riser diagrams.

3.2. PLUMBING SPECIALTY INSTALLATION REQUIREMENTS

- A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.
- B. Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.
- C. Secure supplies to supports or substrate.
- D. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve as appropriate is not indicated.
- E. Install water-supply stop valves in accessible locations.
- F. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- G. Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.
- H. Install ball valves at all shock absorbers to allow removal for service/replacement.

3.3. TESTING

- A. After plumbing fixtures are connected, all piping and fixtures shall be tested for operation and a smoke or peppermint test shall be made on all soil, waste and vent piping.
- B. After the building has been occupied and the various equipment is in actual use, the Contractor shall make an operating test of all equipment at a time directed by the Engineer to determine that all contract requirements are met.

3.4. CLEANING AND STERILIZATION

- A. After final testing for leaks, all potable water lines shall be thoroughly flushed, by plumbing contractor, to remove foreign material. Before placing the systems in service, sterilize the new water lines in accordance with local health department codes and at a minimum according to the following procedure:
1. Through a 3/4-inch hose connection in each branch main and building main, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less than 200 ppm. Plumbing Contractor shall provide plumbing connections and power for pumping chlorine into system.
 2. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident.
 3. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 200 ppm chlorine, retain this water in the system for at least three (3) hours.
 4. CAUTION: Over-concentration of chlorine and more than three (3) hours of retention may result in damage to piping system. It is not necessary to retain chlorine in any system for twenty four hours to achieve sterilization. AWWA states that 200 ppm chlorine for three hours is sufficient.
 5. At the end of the retention period, no less than 100 ppm of chlorine shall be present at the extreme end of the system.
 6. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 ppm.
 7. Obtain representative water sample from the system for analysis by an independent and recognized bacteriological laboratory.
 8. If the sample tested for coliform organisms is negative, a letter and laboratory report shall be submitted by the service organization to the Contractor, certifying successful completion of the sterilization. Additionally, this report shall be forwarded to the Owner as well as be included in the O&M Manual.
 9. If any samples tested indicate the presence of coliform organisms, the entire sterilization procedure shall be repeated.
 10. Take precautions to avoid use of plumbing fixtures and domestic water systems during sterilization period. Place signs on all plumbing fixtures and outlets during sterilization period.

3.5. EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

- B. Verify that electric power is available and of the correct characteristics.

3.6. PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.7. CLEANING

- A. At completion, clean plumbing equipment.

END OF SECTION

CANNOT BE USED FOR BIDDING.

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SECTION 23 05 00 COMMON WORK RESULTS FOR HVAC

PART 1. GENERAL

1.1. SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Provide all labor, materials, equipment, and services necessary for and incidental to the complete installation and operation of all mechanical work.
- C. Unless otherwise specified, all submissions shall be made to, and acceptances and approvals made by the Architect and the Engineer.
- D. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange piping, ductwork, equipment, and other work generally as shown on the contract drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in accordance with *Submittals* specified below. The right is reserved to make reasonable changes in location of equipment, piping, and ductwork up to the time of rough-in or fabrication.
- E. Conform to the requirements of all rules, regulations and codes of local, state and federal authorities having jurisdiction.
- F. Coordinate the work under Division 23 with the work of all other construction trades.
- G. Be responsible for all construction means, methods, techniques, procedures, and phasing sequences used in the work. Furnish all tools, equipment and materials necessary to properly perform the work in first class, substantial, and workmanlike manner, in accordance with the full intent and meaning of the contract documents.

1.2. PERMITS AND FEES

- A. Obtain all permits and pay taxes, fees and other costs in connection with the work. File necessary plans, prepare documents, give proper notices and obtain necessary approvals. Deliver inspection and approval certificates to Owner prior to final acceptance of the work.
- B. Permits and fees shall comply with the Division 01, *General Requirements* of the specification.

1.3. EXAMINATION OF SITE

- A. Examine the site, determine all conditions and circumstances under which the work must be done, and make all necessary allowances for same. No additional cost to the Owner will be permitted for contractors' failure to do so.
- B. Examine and verify specific conditions described in individual specifications sections.

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

1.4. CONTRACTOR QUALIFICATION

- A. Any Contractor or Subcontractor performing work under Division 23 shall be fully qualified and acceptable to the Architect/Engineer and Owner. Submit the following evidence when requested:
 - 1. A list of not less than five comparable projects which the Contractor completed.
 - 2. Letter of reference from not less than three registered professional engineers, general contractors or building owners.
 - 3. Local and/or State License, where required.
 - 4. Membership in trade or professional organizations where required.
- B. A Contractor is any individual, partnership, or corporation, performing work by contract or subcontract on this project.
- C. Acceptance of a Contractor or Subcontractor will not relieve the Contractor or subcontractor of any contractual requirements or his responsibility to supervise and coordinate the work, of various trades.

1.5. MATERIALS AND EQUIPMENT

- A. Materials and equipment installed as a permanent part of the project shall be new, unless otherwise indicated or specified, and of the specified type and quality.
- B. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish named item, or its equal, subject to approval by Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for available space, required arrangement, and application. Submit all data necessary to determine suitability of substituted items, for approval.
- C. The suitability of named item only has been verified. Where more than one item is named, only the first named item has been verified as suitable. Substituted items, including items other than first named shall be equal or better in quality and performance to that of specified items, and must be suitable for available space, required arrangement and application. Contractor, by providing other than the first named manufacturer, assumes responsibility for all necessary adjustments and modifications necessary for a satisfactory installation. Adjustments and modifications shall include but not be limited to electrical, structural, support, and architectural work.
- D. Substitution will not be permitted for specified items of material or equipment where noted.
- E. All items of equipment furnished shall have a service record of at least five (5) years.

1.6. FIRE SAFE MATERIALS

- A. Unless otherwise indicated, materials and equipment shall conform to UL, NFPA and ASTM standards for fire safety with smoke and fire hazard rating not exceeding flame spread of 25 and smoke developed of 50.

1.7. REFERENCED STANDARDS, CODES AND SPECIFICATIONS

- A. Specifications, Codes and Standards listed below are included as part of this specification, latest edition.
- B. AABC - Associated Air Balance Council
- C. ACCA - Air Conditioning Contractors of America
- D. ADC - Air Diffusion Council
- E. AMCA - Air Movement and Control Association
- F. ANSI - American National Standards Institute
- G. ARI - Air Conditioning and Refrigeration Institute
- H. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
- I. ASME - American Society of Mechanical Engineers
- J. ASTM - American Society for Testing and Materials
- K. DNREC - Delaware Department of Natural Resources
- L. IBC - International Building Code
- M. IEEE - Institute of Electrical and Electronics Engineers
- N. NEC - National Electrical Code
- O. NEMA - National Electrical Manufacturers Association
- P. NFPA - National Fire Protection Association
- Q. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
- R. UL - Underwriters' Laboratories
- S. All mechanical equipment and materials shall comply with the codes and standards listed in the latest edition of ASHRAE HVAC Applications Handbook, Chapter entitled *Codes and Standards*.

1.8. SUBMITTALS, REVIEW AND ACCEPTANCE

- A. Equipment, materials, installation, workmanship and arrangement of work are subject to review and acceptance. No substitution will be permitted after acceptance of equipment or materials except where such substitution is considered by the Architect to be in best interest of Owner.
- B. After acceptance of Material and Equipment List, submit three (3) copies or more as required under General Conditions of complete descriptive data for all items. Data shall consist of specifications, data sheets, samples, capacity ratings, performance curves, operating characteristics, catalog cuts, dimensional drawings, wiring diagrams, installation instructions, and any other information necessary to indicate complete compliance with Contract Documents. Edit submittal data specifically for application to this project.
- C. Thoroughly review and stamp all submittals to indicate compliance with contract requirements prior to submission. Coordinate installation requirements and any electrical

requirements for equipment submitted. Contractor shall be responsible for correctness of all submittals.

- D. Submittals will be reviewed for general compliance with design concept in accordance with contract documents, but dimensions, quantities, or other details will not be verified.
- E. Identify submittals, indicating intended application, location and service of submitted items. Refer to specification sections or paragraphs and drawings where applicable. Clearly indicate exact type, model number, style, size and special features of proposed item. Submittals of a general nature will not be acceptable. For substituted items, clearly list on the first page of the submittal all differences between the specified item and the proposed item. The contractor shall be responsible for corrective action and maintaining the specification requirements if differences have not been clearly indicated in the submittal.
- F. Submit actual operating conditions or characteristics for all equipment where required capacities are indicated. Factory order forms showing only required capacities will not be acceptable. Call attention, in writing, to deviation from contract requirements.
- G. Acceptance will not constitute waiver of contract requirements unless deviations are specifically indicated and clearly noted. Use only final or corrected submittals and data prior to fabrication and/or installation.
- H. For any submittal requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return of any reason.

1.9. SHOP DRAWINGS

- A. Prepare and submit shop drawings for all mechanical equipment, specially fabricated items, modifications to standard items, specially designed systems where detailed design is not shown on the contract drawings, or where the proposed installation differs from that shown on contract drawings.
- B. Submit data and shop drawings including but not limited to the list below, in addition to provisions of the paragraph above. Identify all shop drawings by the name of the item and system and the applicable specification paragraph number and drawing number.
- C. Every submittal including, but not limited to the list below, shall be forwarded with its own transmittal as a separate, distinct shop drawing. Grouping of items/systems that are not related shall be unacceptable.

D. Items and Systems

Access Doors/Panels including layouts and locations
Duct Materials
Fans
Fire Dampers
Fire Stopping - Methods and Materials
Grilles, Registers, Diffusers

Identification Systems
Material and Equipment Lists
Operations and Maintenance Manuals
Preliminary Testing and Balancing Reports
Test Certificates
Thermal Insulation Materials Include Table Summaries
Wiring Diagrams, Flow Diagrams and Operating Instructions

- E. Contractor, additionally, shall submit for review any other shop drawings as required by the Architect. No item shall be delivered to the site, or installed, until the Contractor has received a submittal from the Engineer marked *Reviewed* or *Comments Noted*. After the proposed materials have been reviewed, no substitution will be permitted except where approved by the Architect.
- F. For any shop drawing requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return of any reason.

1.10. SUPERVISION AND COORDINATION

- A. Provide complete supervision, direction, scheduling, and coordination of all work under the Contract, including that of subcontractors.
- B. Coordinate rough-in of all work and installation of sleeves, anchors, and supports for piping, ductwork, equipment, and other work performed under Division 23.
- C. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- D. Coordinate electrical work required under Division 23 with that under Division 26. Coordinate all work under Division 23 with work under all other Divisions.
- E. Supply services of an experienced (10 year minimum) and competent Project Manager to be in constant charge of work at site.
- F. Where a discrepancy exists within the specifications or drawings or between the specifications and drawings, the more stringent (or costly) requirement shall apply until clarification can be obtained from the Engineer. Failure to clarify such discrepancies with the Engineer will not relieve the Contractor of the responsibility of conforming to the requirements of the Contract.
- G. Failure of contractor to obtain a full and complete set of contract documents (either before or after bidding) will not relieve the contractor of the responsibility of complying with the intent of the contract documents.

1.11. CUTTING AND PATCHING

- A. Accomplish all cutting and patching necessary for the installation of work under Division 23. Damage resulting from this work to other work already in place, shall be repaired at

Contractor's expense. Where cutting is required, perform work in neat and workmanlike manner. Restore disturbed work to match and blend with existing construction and finish, using materials compatible with the original. Use mechanics skilled in the particular trades required.

- B. Do not cut structural members without approval from the Architect.

1.12. PENETRATION OF WATERPROOF CONSTRUCTION

- A. Coordinate the work to minimize penetration of waterproof construction, including roofs, exterior walls, and interior waterproof construction. Where such penetrations are necessary, furnish and install all necessary curbs, sleeves, flashings, fittings and caulking to make penetrations absolutely watertight.

1.13. CONNECTIONS AND ALTERATIONS TO EXISTING WORK

- A. Unless otherwise noted on the drawings, where existing mechanical work is removed, pipes, valves, ductwork, etc., shall be removed, including hangers, to a point below finished floors or behind finished walls and capped. Such point shall be far enough behind finished surfaces to allow for installation of normal thickness of required finish material.
- B. Where work specified in Division 23 connects to existing equipment, piping, ductwork, etc., Contractor shall perform all necessary alterations, cuttings, fittings, etc., of existing work as may be necessary to make satisfactory connections between new and existing work, and to leave completed work in a finished and workmanlike condition.
- C. Where the work specified under Division 23, or under other Divisions, requires relocation of existing equipment, piping, ductwork, etc., Contractor shall perform all work and make necessary changes to existing work as may be required to leave completed work in a finished and workmanlike condition. Where existing insulation is disturbed, replace insulation where removed or damaged equal to existing, in type, thickness, density, finish and thermal resistance (R-value) value.
- D. Where the relocation of existing equipment is required for access or the installation of new equipment, the contractor shall temporarily remove and/or relocate and re-install as required to leave the existing and new work in a finished and workman like condition.

1.14. DEMOLITION

- A. Unless otherwise noted all existing equipment, piping, ductwork, etc., shall remain.
- B. The Contractor shall be responsible for visiting the site and determining the existing conditions in which the work is to be performed.
- C. Where any abandoned pipes in existing floors, walls, pipe tunnels, ceilings, etc., conflict with new work, remove abandoned pipes as necessary to accommodate new work.
- D. The location of all existing equipment, piping, ductwork, etc., indicated is approximate only and shall be checked and verified. Install all new mechanical/plumbing work to connect to or clear existing work as applicable.

- E. Maintain egress at all times. Coordinate egress requirements with the State Fire Marshal, the Owner and the authorities having jurisdiction.
- F. Existing piping, equipment, ductwork, materials, etc., not required for re-use or re-installation in this project, shall be removed from the project site.
- G. Where piping and/or ductwork is removed, remove all pipe or ductwork hangers which were supporting the removed piping or ductwork. Patch the remaining penetration voids with like materials and paint to match existing construction.
- H. Before demolition begins, and in the presence of the Owners representative, test and note all deficiencies in all existing systems affected by demolition but not completely removed by demolition. Provide a copy of the list of system deficiencies to the Owner and the Engineer. Videotape existing conditions in each space prior to beginning demolition work.
- I. The Owner shall have the first right of refusal for all fixtures, devices and equipment removed by the Contractor.
- J. All devices and equipment designated by the Owner to remain the property of the Owner shall be moved and stored by the Contractor at a location on site as designated by the Owner. It shall be the Contractor's responsibility to store all devices and equipment in a safe manner to prevent damage while stored.
- K. All existing equipment refused by the Owner shall become the property of the Contractor and shall be removed from the site by the Contractor in a timely manner and disposed of in a legal manner.
- L. Work Abandoned in Place: cut and remove underground pipe a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.
- M. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.
- N. Terminate services and utilities in accordance with local laws, ordinances, rules and regulations.

1.15. FASTENERS/CAPS

- A. All fasteners located in public spaces including corridors, lobbies, toilet rooms, etc., shall be provided with tamper proof fasteners. Provide Pin Phillips hardware as manufactured by Challenge Industries or approved equal.

1.16. DEFINITIONS

- A. *Approve* - to permit use of material, equipment or methods conditional upon compliance with contract documents requirements.
- B. *Furnish and install* or *provide* means to supply, erect, install, and connect to complete for readiness for regular operation, the particular work referred to.

- C. *Contractor* means the mechanical contractor and any of his subcontractors, vendors, suppliers, or fabricators.
- D. *Piping* includes pipe, all fittings, valves, hangers, insulation, identification, and other accessories relative to such piping.
- E. *Ductwork* includes duct material, fittings, hangers, insulation, sealant, identification and other accessories
- F. *Concealed* means hidden from sight in chases, formed spaces, shafts, hung ceilings, embedded in construction or attic.
- G. *Exposed* means not installed underground or *concealed* as defined above.
- H. *Invert Elevation* means the elevation of the inside bottom of pipe.
- I. *Finished Spaces*: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceiling, unexcavated spaces, crawl spaces, and tunnels.
- J. *Review* - limited observation or checking to a certain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.
- K. *Building Line*: Exterior wall of building.

1.17. MINIMUM EFFICIENCY REQUIREMENTS

- A. All heating, ventilating and air conditioning equipment shall be manufactured to provide the minimum efficiency requirements as specified in ASHRAE Standard 90.1, latest edition.
- B. All piping, ductwork, and equipment insulation shall comply with ASHRAE Standard 90.1, latest edition.
- C. All mechanical devices, controls, accessories, and components shall be manufactured to provide the minimum efficiency requirements as specified in ASHRAE Standard 90.1, latest edition.

PART 2. ELECTRICAL REQUIREMENTS

2.1. GENERAL MOTOR AND ELECTRICAL REQUIREMENTS

- A. Furnish and install control and interlock wiring for the equipment furnished. In general, power wiring and motor starting equipment will be provided under Division 26. Carefully review the contract documents to coordinate the electrical work under Division 23 with the work under Division 26. Where the electrical requirements of the equipment furnished differ from the provisions made under Division 26, make the necessary allowances under Division 23. Where no electrical provisions are made under Division 26, include all necessary electrical work under Division 23.

- B. All electrical work performed under Division 23 shall conform to the applicable requirements of Division 26 and conforming to the National Electric Code. All wiring, conduit, etc., installed in ceiling plenums must be plenum rated per NFPA & BOCA.
- C. Provide wiring diagrams with electrical characteristics and connection requirements.
- D. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than five (5) horsepower.
- E. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weatherproof covering. For extended outdoor storage, remove motors from equipment and store separately.
- F. All motors shall be furnished with visible nameplate indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor and efficiency.
- G. Nominal efficiency and power factor shall be as scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- H. Brake horsepower load requirement at specified duty shall not exceed 85 percent of nameplate horsepower times NEMA service factor for motors with 1.0 and 1.15 service factors.
- I. All single phase motors shall be provided with thermal protection: Internal protection shall automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature ratings of motor insulation. Thermal protection device shall automatically reset when motor temperature returns to normal range, unless otherwise indicated.

2.2. MOTORS AND CONTROLS

- A. Motors and controls shall conform to the latest requirements of IEEE, NEMA, NFPA-70 and shall be UL listed. Motor sizes are specified with the driven equipment. Motor starting and control equipment is specified either with the motor which is controlled or in an electrical specification section. The Contractor is advised to consult all specification sections to determine responsibility for motors and controls.
- B. Motors shall be designed, built and tested in accordance with the latest revision of NEMA Standard MG 1.
- C. Motors shall be suitable for use under the conditions and with the equipment to which applied, and designed for operation on the electrical systems specified or indicated.
 - 1. Motor capacities shall be such that the horsepower rating and the rated full-load current will not be exceeded while operating under the specified operating conditions. Under no condition shall the motor current exceed that indicated on the nameplates.
 - 2. Motor sizes noted in the individual equipment specifications are minimum

requirements only. It is the responsibility of the equipment manufacturers and of the Contractor to furnish motors, electrical circuits and equipment of ample capacity to operate the equipment without overloading, exceeding the rated full-load current, or overheating at full-load capacity under the most severe operating service of this equipment. Motors shall have sufficient torque to accelerate the total WR^2 of the driven equipment to operating speed.

3. Motors shall be continuous duty type and shall operate quietly at all speeds and loads.
 4. Motors shall be designed for operation on 60 hertz power service. Unless otherwise specified or shown, motors less than ½ horsepower shall be single phase, and motors ½ horsepower and larger shall be 3 phase unless otherwise noted.
- D. Single phase motors, smaller than 1/20 horsepower shall be ball or sleeve bearing; drip-proof, totally enclosed or explosion proof, as specified, 120 volts; permanent-split capacitor or shaded pole type. These motors shall not be used for general power purposes, and shall only be provided as built-in components of such mechanical equipment as fans, unit heaters, humidifiers and damper controllers. When approved by the Engineer, deviations from the specifications will be permitted as follows:
1. Open motors may be installed as part of an assembly where enclosure within a cabinet provides protection against moisture.
 2. Motors used in conjunction with low voltage control systems may have a voltage rating less than 115 volts.
- E. Single phase motors, greater than 1/20 horsepower and less than ½ horsepower shall be ball bearing; drip-proof, totally enclosed or explosion proof, as specified, with Class A or B insulation, as standard with the motor manufacturer; 115 or 120/208/240 volts as required; capacitor start-induction run, permanent split capacitor, or repulsion start-induction run type with minimum efficiency of 70 percent and a minimum full load power of 77 percent.
- F. Control of each motor shall be manual or automatic as specified for each in the various mechanical sections. In general, and unless otherwise specified for a particular item in the various mechanical sections of the specifications, motor starters and controls shall be specified and provided under the various electrical sections of these specifications.

2.3. MOTOR INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors to support shaft regardless of shaft position.
- C. Check line voltage and phase and ensure agreement with nameplate. Check that proper thermal overloads have been installed prior to operating motors.

2.4. WIRING DIAGRAMS

- A. The Contractor is responsible for obtaining and submitting wiring diagrams for all major items of equipment.
- B. Wiring diagrams shall be provided with shop drawings for all equipment requiring electric power.
- C. Provide wiring diagrams for all major mechanical items of equipment to electrical contractor and ATC subcontractor for coordination.

PART 3. EXECUTION

3.1. EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment giving right of way to piping installed at required slope.

3.2. SUPPORTS, HANGERS AND FOUNDATIONS

- A. Provide supports, hangers, braces, attachments and foundations required for the work. Support and set the work in a thoroughly substantial and workmanlike manner without placing strains on materials, equipment, or building structure, submit shop drawings for approval. Coordinate all work with the requirements of the structural division.
- B. Supports, hangers, braces, and attachments shall be standard manufactured items or fabricated structural steel shapes. All interior hangers shall be galvanized or steel with rust inhibiting paint.

3.3. PROVISIONS FOR ACCESS

- A. The contractor shall provide access panels and doors for all concealed equipment, dampers, controls, fire dampers, and other devices requiring maintenance, service, adjustment, balancing or manual operation.
- B. Where access doors are necessary, furnish and install manufactured painted steel door assemblies consisting of hinged door, key locks, and frame designed for the particular wall or ceiling construction. Properly locate each door. Door sizes shall be a 12 inches x 12 inches for hand access, 18 inches x 18 inches for shoulder access and 24 inches x 24 inches for full body access where required. Review locations and sizes with Architect

prior to fabrication. Mark each access door within finished spaces with a small color coded and numbered tab. Provide a chart or index for identification. Provide U.L. approved and labeled access doors where installed in fire rated walls or ceilings. Doors shall be Milcor Metal Access Doors as manufactured by Inland-Ryerson, Mifab, or approved equal.

1. Acoustical or Cement Plaster: Style B
 2. Hard Finish Plaster: Style K or L
 3. Masonry or Dry Wall: Style M
- C. Where access is by means of liftout ceiling tiles or panels, mark each ceiling grid using small color-coded and numbered tabs. Provide a chart or index for identification. Place markers within ceiling grid not on ceiling tiles.
- D. Access panels, doors, etc. described herein shall be furnished under the section of specifications providing the particular service and to be turned over to the pertinent trade for installation. Coordinate installation with installing contractor. All access doors shall be painted in baked enamel finish to match ceiling or wall finish.
- E. Submit shop drawings indicating the proposed location of all access panels/doors. Access doors in finished spaces shall be coordinated with air devices, and lighting to provide a neat and symmetrical appearance.

3.4. PAINTING AND FINISHES

- A. Provide protective finishes on all materials and equipment. Use coated or corrosion-resistant materials, hardware and fittings throughout the work. Paint bare, untreated ferrous surfaces with rust-inhibiting paint. All exterior components including supports, hangers, nuts, bolts, washers, vibration isolators, etc. shall be stainless steel.
- B. Clean surfaces prior to application of insulation, adhesives, coatings, paint, or other finishes.
- C. Provide factory-applied finishes where specified. Unless otherwise indicated factory-applied paints shall be baked enamel with proper pretreatment.
- D. Protect all finishes and restore any finishes damaged as a result of work under Division 23 to their original condition.
- E. The preceding requirements apply to all work, whether exposed or concealed.
- F. Remove all construction marking and writing from exposed equipment, ductwork, piping and building surfaces. Do not paint manufacturer's labels or tags.

3.5. CLEANING OF SYSTEMS

- A. Clean fans, ductwork, enclosures, flues, registers, grilles, and diffusers at completion of work.
- B. Leave systems clean, and in complete running order.

3.6. COLOR SELECTION

- A. Color of finishes shall be as selected by the Architect.
- B. Submit color of factory-finished equipment for acceptance prior to ordering.

3.7. PROTECTION OF WORK

- A. Protect work, material and equipment from weather and construction operations before and after installation. Properly store and handle all materials and equipment.
- B. Cover temporary openings in piping, ductwork, and equipment to prevent the entrance of water, dirt, debris, or other foreign matter. Deliver pipes and tubes with factory applied end caps.
- C. Cover or otherwise protect all finishes.
- D. Replace damaged materials, devices, finishes and equipment
- E. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, where stored inside.

3.8. OPERATION OF EQUIPMENT

- A. Clean all systems and equipment prior to initial operation for testing, balancing, or other purposes. Lubricate, adjust, and test all equipment in accordance with manufacturer's instructions. Do not operate equipment unless all proper safety devices or controls are operational. Provide all maintenance and service for equipment that is authorized for operation during construction.
- B. Upon completion of work, clean and restore all equipment to new conditions; replace expendable items such as filters.

3.9. IDENTIFICATIONS, FLOW DIAGRAMS, ELECTRICAL DIAGRAMS AND OPERATING INSTRUCTIONS

- A. All items of equipment, including motor starters, disconnects and ATC panels shall be furnished with white on black plastic permanent identification cards. Lettering shall be a minimum of ¼ inch high. Identification plates shall be secured, affixed to each piece of equipment, starters, disconnects, panels by screw or adhesive (tuff bond #TB2 or as approved equal).
- B. Provide three (3) copies of operating and maintenance instructions for all principal items of equipment furnished. This material shall be bound as a volume of the *Record and Information Booklet* as hereinafter specified.
- C. All lines installed under this contract shall be stenciled with *direction of flow* arrows and with stenciled letters naming each pipe and ductwork and service. Refer to Division 23 Section, *HVAC Piping, Fittings, Valves, Etc.* and Division 23 Section, *HVAC Air Distribution*. Color-code all direction of flow arrows and labels. In finished spaces omit labeling and direction of flow arrows. Paint in color as selected by Architect.

- D. Submit list of wording, symbols, letter size, and color coding for mechanical identification. Submit samples of equipment identification cards, piping labels, ductwork labels, and valve tags to Engineer for review prior to installation.
- E. Provide at least 4 hours of straight time instruction to the operating personnel. Time of instruction shall be designated by the Owner.
- F. Contractor shall demonstrate Sequences of Operation of all equipment in presence of Owner's representative.

3.10. WALL AND FLOOR PENETRATION

- A. All penetrations of partitions, ceilings, roofs and floors by ducts, piping or conduit under Division 23 shall be sleeved, sealed, and caulked airtight for sound and air transfer control.
- B. All penetration of fire rated assemblies shall be sleeved, sealed, caulked and protected to maintain the rating of the wall, roof, or floor. Fire Marshal approved U.L. assemblies shall be utilized. See Division 07 Section, *HVAC & Plumbing Penetration Firestopping*.
- C. Provide pipe escutcheons and duct flanges for sleeved pipes and ducts in finished areas.
- D. Ductwork sleeves: 20 gauge galvanized steel.

3.11. RECORD DRAWINGS

- A. Upon completion of the mechanical installations, the Contractor shall deliver to the Architect one complete set of prints of the mechanical contract drawings which shall be legibly marked in red pencil to show all changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings.
- B. Contractor shall incorporate all sketches, addendums, value engineering, change orders, etc., into record drawings prior to delivering to Architect.

3.12. WARRANTY

- A. Contractor's attention is directed to warranty obligations contained in the GENERAL CONDITIONS.
- B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of equipment manufacturer's warranties shall be included in the operations and maintenance manuals.
- C. The Contractor guarantees for a two year period from the time of final acceptance by the Owner.
 - 1. That the work contains no faulty or imperfect material or equipment or any imperfect, careless, or unskilled workmanship.

2. That all work, equipment, machines, devices, etc. shall be adequate for the use to which they are intended, and shall operate with ordinary care and attention in a satisfactory and efficient manner.
3. That the contractor will re-execute, correct, repair, or remove and replace with proper work, without cost to the Owner, any work found to be deficient. The contractor shall also make good all damages caused to their work or materials in the process of complying with this section.
4. That the entire work shall be water-tight and leak-proof.

3.13. OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall have prepared three (3) copies of the Record and Information Booklet and deliver these copies of the booklet to the Owner. The booklet shall be as specified herein. The booklet must be approved and will not be accepted as final until so stamped.
- B. The booklet shall be bound in a three-ring loose-leaf binder similar to National No. 3881 with the following title lettered on the front: *Operations and Maintenance Manuals – Delaware State Police Troop #1 Modifications - HVAC*. No sheets larger than 8-1/2 inches x 11 inches shall be used, except sheets that are neatly folded to 8-1/2 inches x 11 inches and used as a pull-out. Provide divider tabs and table of contents for organizing and separating information.
- C. Provide the following data in the booklet:
 1. As first entry, an approved letter indicating the starting/ending time of Contractor's warranty period.
 2. Maintenance operation and lubrication instructions on each piece of equipment furnished.
 3. Chart form indicating frequency and type of routine maintenance for all mechanical equipment. The chart shall also indicate model number of equipment, location and service.
 4. Provide sales and authorized service representatives names, address, and phone numbers of all equipment and subcontractors.
 5. Provide supplier and subcontractor's names, address, and phone number.
 6. Catalog data of all equipment, etc. shall include wiring diagrams, parts list and assembly drawing.
 7. Copy of the approved balancing report.
 8. Access panel charts with index illustrating the location and purpose of access panels.
 9. Approved Electrical Certificates.
- D. Submit Record and Information Booklets prior to anticipated date of substantial completion for Engineer review and approval. Substantial completion requires that Record and Information booklets be reviewed and approved.

3.14. OUTAGES

- A. Provide a minimum of fourteen (14) days notice to schedule outages. The Contractor

shall include in their bid outages and/or work in occupied areas to occur on weekends, holidays, or at night. Coordinate and get approval of all outages with the Owner.

- B. Submit *Outage Request form*, attached at end of his Section, to Owner for approval.

END OF SECTION

CANNOT BE USED FOR BIDDING.

OUTAGE REQUEST

DATE APPLIED: _____ BY: _____

DATE FOR OUTAGE: _____ FIRM: _____

START OUTAGE-TIME: _____ DATE: _____

END OUTAGE -- TIME: _____ DATE: _____

AREAS AND ROOMS: _____

FLOOR(S): _____

AREA(S): _____

ROOM(S): _____

WORK TO BE PERFORMED: _____

SYSTEM(S): _____

REQUEST APPROVED BY: _____

(FOREMAN OR OTHER PERSON IN CHARGE)

(FOR OWNER'S USE ONLY):

APPROVED: _____

YES ___ NO ___ BY: _____ DATE: _____

DATE/TIME-AS REQUESTED: _____ OTHER : _____

OWNER'S PRESENCE REQUIRED: _____

YES: ___ NO: ___ NAME: _____

POINT OF CONTACT: _____ PHONE: _____

**DIVISION 23 SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC
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CANNOT BE USED FOR BIDDING.

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1. GENERAL

1.1. GENERAL

- A. This section covers performance testing, adjusting and balancing of heating, ventilating, air conditioning and domestic re-circulating systems as specified in Division 23 Section, *Heating, Ventilating, and Air Conditioning Equipment* and in Division 22 Sections, *Plumbing Fixtures*, and *Plumbing Equipment*.
- B. For *Common Work Results of HVAC*, See Division 23. See Division 01 for *General Requirements*.
- C. The mechanical contractor shall select and employ an impartial, independent balancing agency to provide testing and balancing services for the heating, ventilating and air conditioning (HVAC) systems and other specified systems of this project.
- D. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results.
- E. The items requiring testing, adjusting, and balancing include, but are not limited to, the following:

Air Systems:

Diffusers, Registers and Grilles
Exhaust Fans
Zone Branch Ducts

1.2. EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Duct systems are clean of debris.
 - 5. Fans are rotating correctly.
 - 6. Fire dampers and volume dampers are in place and open.
 - 7. Access doors are closed and duct end caps are in place.

8. Air outlets are installed and connected.
 9. Duct system leakage is minimized.
 - B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
 - C. Beginning of work means acceptance of existing conditions.
- 1.3. QUALIFICATIONS OF THE BALANCE AGENCY
- A. The balancing agency shall be a member of the Associated Air Balance Council (AABC) and have an engineer certified by the National Examining Board.
 - B. The certified test and balance engineer shall be responsible for supervision and certification for the total work herein specified.
 - C. All final reports shall be signed and officially stamped by the certified test and balance engineer.
- 1.4. STANDARDS
- A. The balancing agency shall perform the services specified herein in accordance with the Associated Air Balance Council's National Standards, including revisions, to the date of the contract.
 - B. All terms in this specification shall have their meaning defined as stated in the National Standards.
 - C. ADC: Test Code for grills, registers, and diffusers.
 - D. ASHRAE III: Practice for measurement, testing, adjusting and balancing of building heating, ventilation, air conditioning, and refrigeration systems.
 - E. NEBB: Procedure standards for testing, adjusting, and balancing of environmental systems.
 - F. SMACNA: HVAC systems testing, adjusting, and balancing.
 - G. AABC: Associated Air Balance Council
- 1.5. COORDINATION
- A. It will be necessary for the balancing agency to perform its services in close coordination with the mechanical contractor.
 - B. The general contractor, mechanical contractor, temperature control contractor and suppliers of the HVAC equipment shall all cooperate with the balancing agency to provide all necessary data on the design and proper application of the system components.

1.6. INSTALLATION TOLERANCE

- A. Unless otherwise indicated, all air devices shall be adjusted to within plus or minus 10 percent of design. All fans shall be adjusted to within plus or minus 5 percent of design.

1.7. RESPONSIBILITIES OF THE MECHANICAL CONTRACTOR

- A. The mechanical contractor shall sufficiently complete the installation and start all HVAC systems to insure they are working properly and shall perform all other items as described hereinafter to assist the balancing agency in performing the testing and balancing of the HVAC system.
- B. Air Distribution Systems
 - 1. Verify installation for conformity to design.
 - 2. Ensure that all volume dampers and fire dampers are properly located and functional.
 - 3. Verify that all supply - return - exhaust and transfer grilles; registers, and diffusers are installed and operational.
 - 4. Ensure that all fans are operating and free of vibration. A record of motor current and voltage shall be made to verify that the motors do not exceed nameplate rating.

1.8. NOTIFICATION FOR TESTING AND BALANCING WORK TO BEGIN

- A. The mechanical contractor shall notify the balancing agency in writing when all heating, ventilating, and air conditioning systems are complete and ready for testing and balancing. The mechanical contractor shall attest that he has completed all items as herein described.
- B. The following must be completed prior to start of system balancing:
 - 1. All duct work and associated grilles/registers/diffusers installed and completed.
 - 2. Equipment properly started by qualified personnel or start-up technicians.
 - 3. Ceiling tiles installed.
 - 4. Automation system (temperature controls) installed and completed.

1.9. DEFICIENCIES

- A. Any deficiencies in the installation or performance of a system or component observed by the TAB agency shall be brought to the attention of the appropriate responsible person.
- B. The work necessary to correct items on the deficiency listing shall be performed and verified by the affected Contractor before the TAB Agency returns to retest. Unresolved

deficiencies shall be noted in the final report.

1.10. ADJUSTING

- A. Ensure recorded data represents actual measured observed conditions.
- B. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. Leave systems in proper working order, closing access doors, closing doors to electrical switch boxes, etc...
- D. Permanently mark the locations of all duct traverses on the outside duct insulation.

PART 2. PRODUCTS (NOT APPLICABLE)

PART 3. EXECUTION

3.1. GENERAL

- A. Perform all testing and balancing in complete accordance with AABC National Standards for Field Measurements and Instrumentation.
- B. Furnish all test instruments and equipment. All instruments must have been calibrated within six (6) months prior to use and shall be checked for accuracy prior to and during the work.
- C. Review all systems designs and equipment, manufacturers' data, and be completely familiar with the work before proceeding.
- D. Report all malfunctions or deficiencies to the contractor so that corrective action can be taken. Test and Balance Report shall not be submitted for review until all malfunctions or deficiencies are corrected. Repeat tests where required until design conditions are achieved.
- E. Where systems or equipment cannot be balanced or adjusted to design conditions, determine the cause and submit a complete report to the Engineer.
- F. Retest or rebalance the system as required during the warranty period.
- G. Test and balance all systems under adequate load condition. If, in the opinion of the Engineer, there is insufficient load to properly test and balance the systems, perform sufficient preliminary balancing and adjustment to permit operation of the systems until such time as final testing and balancing can be done. Provide in writing the future date when systems shall be tested under sufficient load.
- H. At project completion provide a complete set of 1/2 scale drawings indicating the locations of all duct traverses.

3.2. 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 systems for installed balancing devices, such as manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- E. Examine system and equipment installations and verify that field quality-control testing, cleaning and adjusting specified in individual Sections have been performed.
- F. Examine test reports specified in individual system and equipment Sections.
- G. 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.

3.3. AIR SYSTEM PROCEDURES

- A. The balancing agency shall perform the following testing and balancing functions in accordance with the Associated Air Balance Council's National Standards:
 - 1. Fan Speeds - Test and adjust fan RPM to achieve design CFM requirements.
 - 2. Current and Voltage - Measure and record motor current and voltage. Check and record thermal overload ratings for all motors.
 - 3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply, return and exhaust ducts to obtain total CFM. If a Pitot-tube traverse is not practical, the summation of the outlets or inlets may be used. An explanation why a traverse was not made must appear on the appropriate data sheet.
 - 4. Static Pressure - Test and record system static pressures, including suction and discharge static pressure of each fan.
 - 5. Ducts - Adjust ducts to within design CFM requirements and traverse for total CFM quantities.
 - 6. Tolerances - Test and balance each diffuser, grille, and register to within 10 percent of design requirements. Test and balance all fans to within 5 percent of design requirements.
 - 7. Identification - Identify the location and area of each grille, diffuser, and register.

This information shall be recorded on air outlet data sheets.

8. Description - Record the size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
9. Minimizing Drafts - Adjust all diffusers, grilles, and registers to minimize drafts in all areas.

3.4. TESTING AND BALANCING OF EXISTING SYSTEMS

- A. The balancing agency shall perform testing and balancing of existing air handling, fan and pump systems to the extent indicated. Existing air devices and terminals shall be re-tested and balanced where effected by new ductwork modifications.
- B. The TAB agency shall test fire damper to assure operation. It shall verify that an access door has been installed for each fire damper. For fire dampers, the TAB agency shall open the access door, disconnect the fusible link, and allow the damper to close. Operation should be smooth and the damper must close completely. The TAB agency shall then reset the damper. Record the results of tests within TAB report.

3.5. TEST AND BALANCE REPORTS

- A. The test and balance report shall be complete with logs, data, and records as required herein. All logs, data, and records shall be typed on white bond paper and bound. The report shall be certified accurate and complete by the balancing agency's certified test and balance engineer.
- B. Three (3) copies of the test and balance report are required and shall be submitted to the Engineer. If, in the opinion of the Engineer, test results or portions thereof are incomplete or inconclusive, repeat necessary portions of the work to the satisfaction of the Engineer.
- C. The report shall contain the following general data in a format selected by the balancing agency:
 1. Project Number
 2. Contract Number
 3. Project Title
 4. Project Location
 5. Project Architect
 6. Project Mechanical Engineer
 7. Test & Balance Agency
 8. Test & Balance Engineer

9. General Contractor/Construction Manager
10. Mechanical Subcontractor
11. Dates tests were performed
12. Certification
13. Duct Leakage Tests
14. Phone Numbers of all Individuals Listed Above

D. The test and balance report shall be recorded on report forms conforming to the recommended forms in the AABC National Standards.

3.6. TEST REPORT FORMS

A. Air Moving Equipment and Fan Test Forms - Submit fan curve showing design and operating points of operation. Also, record the following on each air-handling equipment test form:

1. Manufacturer, model number, serial number, arrangement.
2. All design and manufacturer-rated data.
3. Total actual CFM by traverse if practical. If not practical, the sum of the outlets may be used, or a combination of each of these procedures. For specific systems, such as ones with diversity, see the AABC National Standards.
4. Suction and discharge static pressure of each fan, as applicable.
5. Exhaust air total CFM.
6. Actual operating current, voltage and brake horsepower of each fan motor.
7. Final RPM of each fan.
8. Total and external static pressure.

B. Electric Motors Test Forms: (Applies to all motors, including pumps, fans and HVAC equipment)

1. Manufacturer.
2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.

- C. Air Distribution Test Sheet:
1. Air terminal number.
 2. Room number/location.
 3. Terminal type.
 4. Terminal size.
 5. Area factor.
 6. Design velocity.
 7. Design air flow.
 8. Test (final) velocity.
 9. Test (final) air flow.
 10. Percent of design air flow.

END OF SECTION

**DIVISION 23 SECTION 23 06 00
HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT
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CANNOT BE USED FOR BIDDING.

SECTION 23 06 00 - HEATING, VENTILATING, AND AIR CONDITIONING EQUIPMENT

PART 1 GENERAL

1.1 GENERAL

- A. The Conditions of the Contract and other General Requirements apply to the work specified in this section. All work under this section shall also be subject to the requirements of Division 23 Section, *Common Work Results for HVAC* and Division 01 Section *General Requirements*.

1.2 DESCRIPTION

- A. The work to be performed shall include all labor, materials and equipment necessary to furnish and install complete, all mechanical equipment as shown on drawings, hereinafter specified or reasonably implied, and leaving the same in satisfactory operation condition. It is the intent that systems be installed complete with all items necessary to accomplish this purpose.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate assembly, equipment dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.
- B. Product Data:
 - 1. Provide literature which indicates dimensions, weights, capacities, ratings, performance, gages and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Provide fan curves with specified operating point clearly plotted.
 - 3. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field installed wiring.

1.4 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of General Requirements.
- B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- C. Store all equipment in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

- D. Comply with manufacturer's installation instructions for rigging, unloading and transporting equipment.
- E. Protect all motors, shafts, and bearings from weather and construction dust.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate any equipment for any purpose, temporary or permanent, until ductwork/piping is clean, bearings lubricated, and equipment has been test run under observation.

PART 2 PRODUCTS

2.1 FANS

A. General

- 1. Provide fans as indicated on the drawings. All fans shall have been tested and their performance rated in accordance with Air Movement and Control Association, Inc., Bulletin 210-85 Test Code and shall be licensed to bear the AMCA Seal. All fans shall carry the AMCA Certified Rating Seal for air and sound. Sound power levels shall be submitted for approval. Fan curves shall be submitted with all fan shop drawings.

B. Ceiling Mounted Exhaust Fans with Integral Grille.

- 1. Furnish and install low speed ceiling mounted exhaust fans with integral grilles of the size, capacity, and electrical characteristics as shown on the contract drawings.
- 2. Ceiling mounted fans shall be of the centrifugal, direct drive type. The fan housing shall be constructed of heavy gauge galvanized steel. The fan housing interior shall be lined with ½-inch acoustical insulation. The outlet duct collar shall include an aluminum backdraft damper and shall be adaptable for horizontal or vertical discharge. The grille shall be constructed of aluminum and painted with a baked enamel white finish. The access for wiring shall be external. The motor disconnect shall be internal and of the plug in type. The motor shall be mounted on vibration isolators. The fan wheels shall be of the forward curved centrifugal type and shall be dynamically balanced.
- 3. Fans shall be completed with backdraft damper, unit mounted solid state speed controller, and plug-in disconnect switch.
- 4. Fan shall be controlled by a wall switch as indicated in Division 26.
- 5. Provide manufacturer's standard, brick vent terminal. Color as selected by Architect.
- 6. Ceiling mounted exhaust fans with integral grilles shall be Model SP as manufactured by Greenheck, Acme Engineering, Cook, Penn Ventilator, or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify all dimensions by field measurements. Verify that all equipment may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
- B. Verify structure, mounting supports and membrane installations are completed to the proper point to allow installation of roof mounted equipment, where applicable.
- C. Examine rough-in requirements for all piping systems to verify actual locations of piping connections prior to installation.
- D. Verify that electrical work installation is in accordance with manufacturer's submittal and installation requirements of Division 26 sections. Do not proceed with equipment start-up until electrical work is acceptable to equipment installer. Coordinate sizes of all thermal overloads with Division 26.
- E. Do not proceed until unsatisfactory conditions have been corrected.
- F. Provide wiring diagrams of all equipment as specified in Division 23 Section, *Common Work Results for HVAC*.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install all equipment in accordance with manufacturer's installation instructions, in accordance with state and local code requirements, and in accordance with the contract drawings. Install all equipment plumb and level, to tolerances as required by the manufacturer of each item of equipment. Maintain manufacturer recommended clearances around and over all equipment.
- B. Coordinate all electrical requirements with Division 26.
- C. Connect all equipment, devices and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.
- D. Testing: After installing HVAC equipment, devices and components and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
- E. Remove and replace malfunctioning units with new units and retest.
- F. All mechanical penetrations or terminations in exterior walls shall be flashed and caulked watertight.

3.3 FIELD QUALITY CONTROL

- A. Where factory start-up of equipment is not specified, provide field start-up by qualified technician to examine the field assembly of components, installation, piping, electrical connections, controls and clearances. Record equipment manufacturers standard start-up information and submit to Engineer for review. Testing and balancing work shall not commence until start-up reports have been completed, reviewed by Engineer, and forwarded to Testing and Balancing Agency.
- B. Verify proper motor sizes, voltages, nameplate data, etc. All equipment voltages and current shall be recorded to insure that motors are operating below their service factors. Test and Balance Engineer shall record electrical data before continuous or permanent operation.

3.4 DEMONSTRATION

- A. Place equipment into operation and adjust controls and safeties. Replace damaged or malfunctioning components and controls.
- B. Training:
 - 1. Review with the Owner's personnel the contents of the operation and maintenance data specified in Division 23 Section, *Common Work Results for HVAC*.
 - 2. Submit operation and maintenance data as soon as possible prior to project close-out. Operations and maintenance data shall be submitted to the Owner for review and comment prior to submission to the Engineer.

3.5 CLEANING

- A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
- B. Clean fan and equipment interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils' entering air face.

3.6 FAN INSTALLATION REQUIREMENTS.

- A. Install fans with resilient mounting and flexible electrical leads.
- B. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fans have been test run under operation.
- C. Install fans according to manufacturer's written instructions.
- D. Where specified, mount, install, and wire speed controllers for direct drive fans. Speed controllers for direct drive fans shall be mounted adjacent to fan and wired in accordance with the NEC.

END OF SECTION

**DIVISION 23 SECTION 23 07 01
HVAC INSULATION**

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CANNOT BE USED FOR BIDDING.

SECTION 23 07 01 - HVAC INSULATION

PART 1. GENERAL

1.1. REFERENCE

- A. The Conditions of the Contract and other General Requirements apply to the work specified in this Section. All work under this Section shall be subject to the requirements of Division 23 Section, *Common Work Results for HVAC*.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2. DESCRIPTION

- A. All ductwork installed under this Contract shall be covered as specified.

1.3. SCOPE

- A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct fabrication and installation of thermal insulation applied to all piping, equipment, and duct systems, in accordance with applicable project specifications and drawings, subject to the terms and conditions of the contract.

1.4. STANDARDS

- A. Thermal insulation materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or use:
 - 1. American Society for Testing of Materials Specifications:
 - a). ASTM C 55, "Standard Specification for Mineral Fiber Blanket and Felt Insulation".
 - b). ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Material".
 - c). ASTM C 1136, "Standard Specification for Barrier Material, Vapor, "Type 1 or 2 (Jacket only)".
 - d). ASHRAE 90.1 "Energy efficient design of new buildings except low-rise residential buildings", latest edition.
- B. Insulation materials, including all weather and vapor barrier materials, closures, hangers, supports, fitting covers, and other accessories, shall be furnished and installed in strict accordance with project drawings, plans, and specifications.

1.5. SYSTEM PERFORMANCE

- A. Insulation materials furnished and installed hereunder should meet the minimum economic insulation thickness requirements of the North American Insulation Manufacturers' Association (NAIMA) (formerly known as TIMA), to ensure cost-effective energy conservation performance. Alternatively, materials should meet the minimum thickness requirements of National Voluntary Consensus Standard 90.1, (latest edition) and "Energy Efficient Design of New Buildings," of the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), latest edition. However, if other factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor. As minimum, all insulation thicknesses shall be as hereinafter specified.
- B. Insulation materials furnished and installed hereunder shall meet the fire hazard requirements of any one of the following specifications:
- | | | |
|----|---|-----------|
| 1. | American Society for Testing of Materials | ASTM E 84 |
| 2. | Underwriters' Laboratories, Inc. | UL 723 |
| 3. | National Fire Protection Association | NFPA 255 |

1.6. QUALITY ASSURANCE

- A. Insulation materials and accessories furnished and installed hereunder shall, where required, be accompanied by manufacturers' current submittal or data sheets showing compliance with applicable specifications listed in Section 1.4 above.
- B. Insulation materials and accessories shall be installed in a workmanlike manner by skilled and experienced workers who are regularly engaged in commercial insulation work.

1.7. DELIVERY AND STORAGE OF MATERIALS

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The Contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The Contractor shall also use all means necessary to protect work and materials installed by other trades.
- C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the Contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the Contractor is able to demonstrate that wet insulation when fully dried out (either before installation, or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer in writing for technical assistance.

- D. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements. Protect all insulation from water, construction traffic, dirt, chemical and mechanical damage.

PART 2. PRODUCTS

2.1. GENERAL

- A. All materials to be insulated shall be thoroughly cleaned, after completion of successful tests, and shall be covered as specified below. Fiberglass insulation shall be Owens-Corning, Manville, Armstrong, or P.P.G, or as approved equal.

2.2. DUCTWORK INSULATION MATERIALS AND THICKNESSES

- A. Insulate all supply, ductwork with fiberglass exterior duct insulation with factory-applied foil facing. All concealed fiberglass duct insulation shall be 1-1/2-inch flexible blanket type, 1.0 pcf minimum density. All concealed insulation shall be 0.27 max. "K" factor at 75 degrees F mean temperature with reinforced foil-scrim Kraft vapor barrier facing.
- B. Where a vapor barrier is required, all joints, seams, tears, punctures, and other penetrations shall be closed with 3-inch (7.5cm) pressure-sensitive tape matching the facing or with vapor barrier coating reinforced with 3-inch (7.5cm) glass scrim tape.
- C. All disturbed ductwork insulation in existing areas shall be re-insulated with insulation type and thickness as specified for new ductwork. Duct insulation damaged due to installation of new work and demolition only shall be replaced.
- D. All supply air diffusers and supply air registers shall be fully insulated on the rear exposed surface to prevent condensation. Insulation shall be 1 1/2" inch flexible blanket type 1 1/2 pcf minimum density with reinforced foil-scrim-Kraft vapor barrier facing, .25 max "k" factor.

2.3. ACCESSORY MATERIALS

- A. Accessory materials installed as part of insulation work under this section shall include, but not be limited to:
 - 1. Closure Materials - Butt strips, bands, wires, staples, mastics, adhesives; pressure-sensitive tapes.
 - 2. Field-applied jacketing materials - sheet metal, plastic, canvas, fiber glass cloth, insulating cement; PVC fitting covers, PVC jacketing.
 - 3. Support Materials - Hanger straps, hanger rods, saddles.
 - 4. Fasteners, weld pins/studs, speed clips, insulation washers.
 - 5. Metal mesh or expanded metal lagging.
- B. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of

the Midwest Insulation Contractors Association (MICA) "Commercial & Industrial Insulation Standards."

2.4. FIELD-APPLIED JACKET

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

PART 3. EXECUTION

3.1. WORKMANSHIP

- A. The Contractor shall take special care to prevent soiling equipment below or adjacent to areas being insulated. He shall be completely responsible for removing insulation cement splashes and smears and all surfaces that he mars or otherwise soils or defaces, and he will be totally responsible for restoring these damaged surfaces to their like-new condition when delivered to the site.

3.2. SITE INSPECTION

- A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.
- B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.3. PREPARATION

- A. Ensure that all pipe and equipment surfaces over which insulation is to be installed are clean and dry.
- B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.
- C. Ensure that pressure testing of piping or duct systems has been completed prior to installing insulation.

3.4. INSTALLATION

- A. Ductwork Insulation:
 - 1. General:

- a). Before installing insulation, ensure that all seams and joints in ductwork have been sealed and leak tested by the contractor responsible for the duct system. Before applying duct insulation, air ducts shall be clean and dry.
- b). Install insulation in accordance with manufacturer's published instructions and recognized industry practice to ensure that it will serve its intended purpose.
- c). Install insulation materials with smooth and even surfaces. Butt joints firmly together to ensure complete and tight fit over surfaces to be covered.
- d). Maintain the integrity of factory-applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage. All staples used on ductwork insulation shall be coated with suitable sealant to maintain vapor barrier integrity and covered with pressure sensitive vapor barrier tape and vapor barrier coating as specified.
- e). Insulate entire system including fittings, joints, flanges, flexible connections, fire dampers, and exposed joints.
- f). To ensure installed thermal performance, duct wrap insulation shall be cut to "stretch-out" dimensions. Maintain specified duct insulation thickness and vapor barrier at all fittings, obstructions, and duct flanges.
- g). A 2-inch (50mm) piece of insulation shall be removed from the facing at the end of the piece of duct wrap to form an overlapping stapling and taping flap.
- h). Install duct wrap insulation with facing outside so that the tape flap overlaps the insulation and facing at the other end of the piece of duct wrap. Adjacent sections of duct wrap insulation shall be tightly butted with the 2-inch (50mm) stapling and taping flap overlapping. If ducts are rectangular or square, install so insulation is not excessively compressed at corners. Seams shall be stapled approximately 6-inches (150mm) on center with 2-inch (13mm) (min) steel outward clinching staples.
- i). Seams, joints and staples shall be sealed with pressure-sensitive tape matching the insulation facing (either plain foil or FRK backing stock) and glass fabric and vapor barrier coating. Cloth duct tape of any color or finish using reclaimed rubber adhesives shall not be utilized on duct wrap insulation. Adjacent sections of duct wrap shall be tightly butted with the 2-inch (50mm) tape flap overlapping.
- j). Seal all tears, punctures and other penetrations of the duct wrap facing using one of the above methods to provide a vapor tight system.
- k). Upon completion of installation of duct wrap and before operation is to commence, visually inspect the system and verify that it has been correctly installed.

- l). Open all system dampers and turn on fans to blow all scraps and other loose pieces of material out of the duct system. Allow for a means for removal of such material.
 - m). Check the duct system to ensure that there are no air leaks through joints.
 - n). No ductwork insulation shall be supported utilizing tie wire or bailing wire. Penetrations of ductwork insulation vapor barrier are prohibited.
 - o). Bevel and terminate insulation at access doors. Paint edges with vapor barrier mastic.
 - p). Install insulation board between volume dampers and sheet metal standoffs.
 - q). Provide removable insulation section at all pitot tube traverse points. Insulation section shall contain tether that attaches to adjacent ductwork.
- 2. Penetrations: Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise specified.
 - 3. Duct Wrap Insulation: Duct wrap insulation shall be applied with all joints butted firmly together. All joints in the insulation covering shall be sealed with adhesive.

3.5. FIELD QUALITY ASSURANCE

- A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

3.6. PROTECTION

- A. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.
- B. The insulation contractor shall advise the general and/or the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

3.7. SAFETY PRECAUTIONS

- A. Insulation contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.
- B. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

END OF SECTION

CANNOT BE USED FOR BIDDING.

**DIVISION 23 SECTION 23 30 00
HVAC AIR DISTRIBUTION**

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CANNOT BE USED FOR BIDDING.

SECTION 23 30 00 - HVAC AIR DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

- A. For General Mechanical Requirements, see Division 23 Section, "Common Work Results for HVAC" and Division 01, "General Requirements".
- B. The fabrication and installation of all ductwork, together with related equipment, shall comply with the standards of the National Fire Protection Association, as set forth in NFPA Standard No. 90A, as well as with the requirements of the Sheet Metal and Air Conditioning Contractors' National Association, Inc., and the latest edition of the ASHRAE Guide.
- C. All duct sizes shown are net inside clear dimensions. Unless otherwise indicated size runouts, drops, and connections to grilles, registers, diffusers, fans, coils, louvers, filters, and other equipment to the full size of the equipment connection.
- D. Minor changes may be made in duct sizes where required to fit the available space, provided the indicated net free area and approximate aspect ratio are maintained.
- E. Smoothly transition all ductwork to prevent excessive or unnecessary turbulence or pressure loss.

1.2 REFERENCES

- A. ASTM A 36 - Structural Steel.
- B. ASTM A 90 - Weight of coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- C. ASTM C 916 Type II - Standard Specification for Adhesives for Duct Thermal Insulation.
- D. ASTM A 366 - Steel, Sheet, Carbon, Cold Rolled, Commercial Quality.
- E. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- F. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- H. NFPA 70 - National Electrical Code.
- I. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- J. UL 555 - Fire Dampers and Ceiling Dampers.

1.3 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE Table of Equivalent Rectangular and Round Ducts.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the projects specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum five (5) years' experience.

1.5 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA- 90A Standards.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturer.
- B. Maintain temperatures during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 DUCTWORK

- A. Unless otherwise indicated or specified, fabricate ductwork of galvanized sheet steel, stainless steel, or aluminum conforming to Commercial Designation 3003 Temper H14 and Duct Sheet. Duct gages, jointing and reinforcement shall conform to Tables 4, 5, 6 and 7, as applicable, Chapter I of the latest *ASHRAE Guide and Data Book*. Construction details shall conform to Section I and Section II, as applicable, of *Duct Manual and Sheet Metal Construction for Ventilation and Air Conditioning Systems* as published by Sheet Metal and Air Conditioning Contractors' Association, Inc.
- B. Erect sheet metal ductwork in a first-class, workmanlike manner secured in place rigidly and permanently. Provide suitable hangers, securely attached to building construction with bolts, clips or inserts. Hangers shall be structural shapes, flat bars, or formed strap hangers; use of wire will not be permitted. Hangers shall not pass through or be inside duct. All space around ducts where they pass through any walls, floors, ceilings, or roofs shall be sealed tight with incombustible inert material. Do not arrange ducts so as to impair the effectiveness of fireproofing around structural members. Seal all duct joints and seams including supply, return, outside air, combustion air, relief air, ventilation air and exhaust ductwork with *Hardcast* Sealing System as manufactured by Hardcast, Inc., Foster, Childers, or approved equal.
- C. Provide cut turning vanes in all duct turns where centerline radius is located. Turning vanes shall be air-foil type with extended trailing edges. Fabricate to comply with SMACNA Sheet Metal Construction for Ventilation and Air Conditioning Systems

Manual.

- D. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- E. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- H. Fasteners: Rivets, bolts, or sheet metal screws.
- I. Hanger Rods: ASTM A36 - Galvanized steel; threaded both ends, threaded one end, or continuously threaded.

2.2 DUCT SYSTEMS

- A. All supply, and exhaust ductwork shall be constructed for low pressure service (2 inch W.G.).

2.3 DUCT CONSTRUCTION

- A. Rectangular and/or Round Ductwork (Low Pressure):
 - 1. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock forming quality, having G-90 Zinc coating in conformance with ASTM A90.
 - 2. Determine duct gauges for the longest duct side and use for all four sides. Joints and reinforcing requirements apply to the longest duct side.
 - 3. Reinforce all ducts to prevent buckling, vibration, or noise as recommended in the referenced construction standards, and as required to suit the installed conditions.
 - 4. Do not cross break duct which will receive rigid insulation covering.
 - 5. Where tap sizes of divided-flow fittings are not indicated, make branch and main/connection sizes proportional to their respective air flows and maintain uniform transverse velocities in the fitting.
 - 6. Make radius elbows and radius tee connection with throat radius equal to or greater than the width of the duct. Use vaned elbows where shown and where

radius elbows will not fit the space, and in all square bends.

7. Turning vanes shall be the air-foil type with extended trailing edges, 36-inch maximum vane length. Where longer vanes are required, use two or more sets of vanes with intermediate runners securely fastened together.
8. Bolt, screw, rivet, or spot weld reinforcing members securely to the duct on not less than 6-inch centers.
9. Paint all cut ends on galvanized angles, rods, and other uncoated surfaces with aluminum paint.
10. Where ductwork is not painted or otherwise finished, remove all exposed traces of joint sealers, manufacturer's identification and other markings.
11. Determine duct gauges per SMACNA based on duct size and pressure indicated.

2.4 AIR VOLUME CONTROLS

- A. Furnish and install air volume control devices where indicated and where required to adjust and balance air flow in the systems, whether indicated or not. Volume dampers shall be provided in all branch ducts serving air outlets and inlets.
- B. Manual volume dampers in ductwork shall be factory-assembled units with rigid frame, opposed-blade action, and locking quadrant operator. Mark the extended damper shaft and align the operating handle to indicate the blade position. Dampers shall be as manufactured by Ruskin, American Warming and Ventilating, Inc., Arrow, or approved equal. Rectangular dampers shall be Type MD35, with steel channel frame, 16 gauge steel blades, 9 inch maximum blade spacing, low pressure, nylon bearings, galvanized finish with aluminum paint touch up. Round manual balancing dampers shall be Type MDRS25 manufactured by Ruskin, Arrow, American Warming and Ventilating, Inc., or as approved equal. When external insulation is to be applied, provide sheet metal standoffs on all manual volume dampers.
- C. Duct turning vanes shall be Tuttle & Bailey *Ducturns*, or approved equal.

2.5 INSTRUMENT TEST PORTS

- A. Furnish and install instrument test ports in the ductwork to allow use of pitot tube length. Equip holes with Ventlok #699 instrument ports. Fittings shall extend beyond duct covering and insulation.

2.6 AIR TERMINAL DEVICES

- A. Furnish and install air supply, return, exhaust devices of sizes and capacities as scheduled on the drawings. Catalog numbers shown are Metalaire, Inc., products for equipment which have been found suitable for the application. Products of Tuttle & Bailey, Anemostat, Division of Hart & Cooley, Carnes, Titus, Price, or approved equal will be considered only if performance characteristics including throw, drop, pressure loss, sound pressure level, etc., are equal to or better than the performance characteristics of the specified products. All air devices shall be ADC certified. Ductwork behind registers,

grilles and diffusers shall be given two coats of flat black paint. Perimeter of all ceiling diffusers shall be caulked to provide a neat, aesthetic appearance.

B. Device Schedule:

AIR DEVICE SCHEDULE		
Device	Accessories	Finish
Supply Diffusers, Lay-in Tile		
Model 5000-A, Rectangular MetalAire Ceiling Diffuser, Throw as Indicated	Integral opposed blade damper	White baked enamel finish
	Removable core	
	Louvered face	
	All aluminum construction	
	Auxiliary panel for lay-in tile installation	
	Adjustable pattern deflector	
Exhaust Lay-in Tile		
MetalAire, Model RHD Rectangular Registers	Integral opposed blade damper	Off-white baked enamel finish
	45 degree angled deflecting vanes	
	All aluminum construction	
	Auxiliary panel for lay-in tile installation	
	Provide return air filters racks and 1" thick filters where indicated.	

- C. Where air terminal devices are installed in duct collars or branches, furnish and install air extractors. Furnish and install control grids, volume dampers, and/or other accessories necessary to ensure uniform air flow across the terminal devices. Accessories shall be of the same material as the terminal device. Install fixed blade terminals so that blades block the normal line of vision. Furnish three (3) of each type of removable key operators.
- D. Contractor shall determine frame and mounting type as per type of ceiling as shown on Architectural drawings.
- E. Noise Criteria: All air devices shall be sized and selected to limit maximum NC (noise criteria) levels to 30.

2.7 DUCT SEALANTS AND ADHESIVES

- A. All ductwork shall be sealed, including low pressure exhaust systems. Transverse joints and longitudinal seams in duct systems shall be sealed with a duct sealant of the type specified hereinafter in Section 1, 2, or 3, or with a tape sealing system as specified in Section 4. Spiral lockseams are not longitudinal seams and do not require duct sealant. All seams and joints shall require duct sealant suitable for the pressure rating and installation application. All sealants shall exceed 500 hours without becoming brittle under ASTM-D572 test conditions (oxygen bomb), unless specified otherwise. No surface preparation or solvent cleaning shall be necessary to remove light coatings of oil and dust before applying sealant unless specified otherwise. Flanged joints shall be sealed according to Section 5. Construction joints that are not fully welded shall be sealed according to Section 6. Adhesive to secure insulation to metal surfaces shall be that specified in Section 7.
1. Assembly joints to be installed indoors or outdoors shall be sealed with Foster 32-19, Childers CP-146, United Duct Sealer WB, or equivalent, which is a water-based sealant formulated to withstand service temperatures from 20 degrees F to +200 degrees F. Sealant shall have a UL Classification marking with a flame spread of 15 and smoke developed of 0 when applied to inorganic reinforced cement board, both at a coverage of 31 square feet per gallon. Store and apply between 40°F (4°C) and 100°F (38°C); protect from freezing.
 2. Assembly joints to be installed indoors shall be sealed with Foster 32-19, childers CP-146, UNI-GRIP™ duct sealer or equivalent, which is a water-based (vinyl-acrylic polymer) sealant formulated to withstand temperatures from -20 degrees to +200 degrees Fahrenheit. Surfaces to be sealed should be clean, dry, and free from oil, grease, and dirt. Sealant shall be nonflammable (wet) and fire retardant. Sealant shall have a UL Classification marking with a flame spread of 5 and smoke developed of 5 when applied to 18-gauge galvanized steel and a flame spread of 0 and smoke developed of 0 when applied to inorganic reinforced cement board, both at a coverage of 40 square feet per gallon.
 3. Assembly joints shall be sealed with UNI-CAST® tape sealing system or equivalent, which is a combination of an adhesive activator and woven-fiber tape impregnated with a gypsum mineral compound. Modified acrylic/silicone activator (MTA-20 for indoor use) reacts exothermically with the tape to form a hard, airtight seal. Sealant shall be formulated to withstand temperatures from -40 degrees F to +200 degrees Fahrenheit. Combination of tape and MTA-20 adhesive shall have a flame spread and smoke developed of 0. Do not use for outdoors.
 4. Flanged joints to be installed indoors shall be sealed with UNI-GASKET™ flange sealer or equivalent, which has a synthetic elastomer base and is formulated to withstand temperatures from -20 degrees F to +150 degrees F. Sealant shall have a UL Classification marking with a flame spread of 5 and smoke developed of 5 when applied to 18-gauge galvanized steel and a flame spread of 0 and smoke developed of 5 when applied to inorganic reinforced cement board, both at a coverage of 80 square feet per gallon.
 5. Where duct fittings are constructed with standing seam or spot-welded techniques, all construction joints shall be sealed with UNI-WELD™ metal cement or equivalent, which is composed of neoprene rubber, resins, and inert

reinforcing material dispersed in a petroleum distillate. Sealant shall be formulated to withstand temperatures from -20 degrees F to +225 degrees F. Sealant shall have a UL Classification marking with a flame spread of 0 and smoke developed of 0 when applied to 18-gauge galvanized steel and a flame spread of 0 and smoke developed of 0 when applied to inorganic reinforced cement board, tested as applied in two 1/8 inch beads 8 inches on center.

6. Where insulation is to be secured to metal surfaces, the adhesive used shall be Foster 85-60, Childers CP-127, UNI-TACK™ duct liner adhesive or equivalent, which are water-based, vinyl-acrylic copolymer adhesives formulated to withstand temperatures from -20 degrees Fahrenheit to +200 degrees Fahrenheit. Adhesive shall have a UL Classification marking with a flame spread of 0 and smoke developed of 0 when applied to 18-gauge galvanized steel and a flame spread of 0 and smoke developed of 0 when applied to inorganic reinforced cement board, both at a coverage of 267 square feet per gallon. Adhesive shall conform to ASTM C916, Type II.

- B. Manufacturers: Duct Mate, United McGill, Semco, Elgen, Childers, Foster, or as approved equal.

2.8 FIRE DAMPERS

- A. Furnish and install automatic fire dampers where indicated, in all 2-hour fire-rated partitions, shafts, slabs, etc., and where required by NFPA Standard No. 90A and by the Fire Marshal. Refer to the architectural drawings for location of all fire-rated walls, shafts and slabs. Fire Dampers shall also be provided at all transfer air devices installed in rated walls at all floor penetrations, and as shown on the contract drawings.
- B. Construction of fire dampers shall conform to requirements of NFPA No. 90A, UL Standard 555 and shall bear UL label. Fire dampers shall be set in frames adequately secured to fire partitions, floors, etc., and installed in strict accordance with UL listing and manufacturer's instructions.
- C. Fire damper shall be Dynamic Type for rectangular ductwork and round ductwork as manufactured by Ruskin, Air Balance, Inc., Arrow, Greenheck, Lloyd Industries, or approved equal, multi-leaf accordion type, held open by adequate heavy gauge wires and suitably calibrated fusible links. Vertical dampers (horizontal air flow) shall close by gravity. Horizontal dampers (vertical air flow) shall be closed by suitable and positive spring closing devices.
- D. Damper frames shall provide pocket which shall store the damper leaves in open position outside of the air stream and shall provide for 100 percent opening connecting to ductwork or grille face. Damper material shall match connecting ductwork.
- E. Provide adequately sized hinged access doors with cam locks for access to all fusible links and for resetting fire dampers. Where applicable, access to fire dampers shall be through registers or grilles. Provide identification on access door indicating fire damper within. Letters shall be not less than 1/2-inch in height.
- F. Submit complete information to the Engineer including installation details. Furnish and install sleeves, angles, break-away duct connections, per UL listing.

- G. Furnish to the Owner in a suitable storage container not less than six (6) fusible links of each type, size, and rating used on the project. Where required, furnish Greenheck Type CR, CO, or Type C transition sleeves.

2.9 DUCT ACCESS DOORS

- A. Furnish and install adequately sized duct access doors at fire dampers, and other locations where indicated and required for duct access. Doors shall be the continuous piano-hinged type with approved latches and neoprene compression-type gaskets with 1 inch thick fiberglass double skin and shall be Ruskin Model ADH22, Air Balance, Inc., FSA-100 or as approved equal. Stiffen ductwork at door openings. Where doors are installed in insulated ductwork, provide equivalent insulation in the door assembly. Where access doors are installed in the fire-rated partitions, provide *Fire Seal* access doors as manufactured by Air Balance, Inc., or approved equal, UL approved, meeting the rating of the enclosure in which the access door is installed.
- B. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

PART 3 EXECUTION

3.1 DUCT INSTALLATION REQUIREMENTS

- A. Coordinate ductwork with other work and install ducts at proper elevations and locations to maintain indicated ceiling heights and clearances. Provide all elbows, transitions, offsets, connections, and other fittings necessary to fit the work into place or to connect to equipment or diffusers. Method of duct support connection to structure and slabs shall be approved by Structural Engineer, and Shop Drawings shall be submitted.
- B. Substantially support ductwork with structural shapes, flat bars, or formed strap hangers securely attached to the building structure by means of bolts, clamps, or inserts. Strap hangers shall be 16-gauge minimum galvanized steel formed under the bottom edge of duct. Use square 1/4 inch thick washers tight against the bend on upper strap attachments to horizontal surfaces. Place all supports external to the ductwork and out of the air stream. Arrange supports so that duct weight is not transmitted to ceilings, fans or other equipment. Support vertical ducts by angles attached to the duct and resting on the floor or supported by brackets or hangers attached to the building structure.
- C. Prevent direct contact between ductwork and building surfaces or other equipment. Where ducts pass through walls, partitions, floors, ceilings, or roofs, pack and seal the space around the duct with an approved fire-safe inert material. Provide flanged duct escutcheons at all exposed ducts that pass through walls, partitions, floors, and ceilings.
- D. Use galvanized (compatible) corrosion-resistant hangers, supports, brackets, and hardware.
- E. See NFPA 90A, and latest publication of SMACNA. Prevent direct contact between ductwork and building surfaces or other equipment. The opening in the construction around the duct shall not exceed one-inch average clearance on all sides. Where ducts pass through walls, partitions, floors, ceilings, or roofs, pack and seal the space around the duct with an approved fire-safe inert material capable of preventing the passage of

flame and hot gases sufficiently to ignite cotton waste when subjected to the same NFPA 251 Time-Temperature Conditions required for fire barrier penetration.

- F. Install in accordance with manufacturer's instructions.
- G. Install and seal ducts in accordance with SMACNA *HVAC Duct Construction Standards - Metal and Flexible*.
- H. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal cap with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- I. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- J. Use crimp joints, with or without bead, for joining round duct sizes eight (8) inches and smaller with crimp in direction of air flow.
- K. Use double nuts and lock washers on threaded rod supports.
- L. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork systems.

3.2 ACCESSORY INSTALLATION REQUIREMENTS

- A. Install accessories in accordance with manufacturer's instruction, NFPA 90A, and SMACNA *HVAC Duct Construction Standards - Metal and Flexible*.
- B. Provide duct access doors for inspection and cleaning before and after fire dampers and elsewhere as indicated. Review locations prior to fabrication.
- C. Provide duct test holes where required for testing and balancing purposes. Review locations with Test and Balance Engineer prior to installation.
- D. Provide fire dampers at locations as indicated, where ducts and outlets pass through fire-rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion-resistant springs, bearings, bushings and hinges.
- E. Demonstrate re-setting of fire dampers to Owner's representative.
- F. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum duct widths from duct take-off.
- G. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- H. Install diffusers, registers, and grilles to ductwork with airtight construction.

- I. Check location of all air outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangements.
- J. Install duct accessories according to applicable details shown in SMACNA's *HVAC Duct Construction Standards--Metal and Flexible* for metal ducts.
- K. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- L. Install fire dampers according to manufacturer's UL-approved written instructions.
- M. Adjust fire dampers for proper action.

3.3 CLEANING

- A. Clean duct system and force air at high velocity through ducts to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.
- B. Clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.
- C. Ductwork shall be cleaned in accordance with "Duct Cleanliness for New Construction (SMACNA 2000)", and shall achieve a "Basic" cleanliness level.

3.4 DUCTWORK IDENTIFICATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. All ductwork shall be identified with painted background marked with the name of the service with arrows to indicate flow direction. Color Code and System Identification shall comply with ANSI Standards.
- C. Marking shall be plain block letters, stenciled on ductwork (above and below ceilings) and shall be located near each branch connection and at least every ten feet on straight runs of ductwork. Where ductwork is aligned adjacent to each other, markings shall be neatly lined up. All markings shall be located in such a manner as to be easily legible from the floor.
- D. Identify ductwork with plastic nameplates or stenciled painting. Identify with air handling unit identification and area served.
- E. Length of color field for ductwork shall be 32 inches. Lettering shall be minimum 3-1/2 inches high.

END OF SECTION

**DIVISION 26
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SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 ALTERNATES

- A. Refer to Division 01 Section, "Alternates" for description of work under this Section affected by Alternates.

1.3 SUMMARY

A. Section Includes:

- 1. Sleeves for raceways and cables.
- 2. Foam Duct Sealant.
- 3. Common electrical installation requirements.

- B. Provide all labor, materials, equipment, and services necessary for and incidental to the complete installation and operation of all electrical work.

- C. Unless otherwise specified, all submissions shall be made to, and acceptances and approvals made by the Architect and the Engineer.

- D. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange conduits, equipment, and other work generally as shown on the Contract Drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in accordance with Article "Submittals" specified below. The right is reserved to make reasonable changes in location of equipment, boxes, conduit/wiring, and devices, up to the time of rough-in or fabrication.

- E. Conform to the requirements of all rules, regulations and codes of local, state and federal authorities having jurisdiction.

- F. Coordinate the work under Division 26 with the work of all other construction trades.

- G. Be responsible for all construction means, methods, techniques, procedures, and phasing sequences used in the work. Furnish all tools, equipment and materials necessary to properly perform the work in first class, substantial, and workmanlike manner, in accordance with the full intent and meaning of the Contract Documents.

- H. Arrange conduit, wiring, equipment, and other work generally as shown, providing proper clearances and access. Carefully examine all Contract Drawings and fit the work in each location without substantial alteration. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in

accordance with Article "Submittals" as hereinafter specified. The right is reserved to make reasonable changes in location of equipment, conduit and wiring up to the time of rough-in or fabrication.

1.4 PERMITS AND FEES

- A. Obtain all permits and pay taxes, fees and other costs in connection with the work. File necessary plans, prepare documents, give proper notices and obtain necessary approvals. Deliver inspection and approval certificates to Owner prior to final acceptance of the work.
- B. Permits and fees shall comply with Division 01 Section, *General Requirements*.
- C. Notify Inspection Authorities to schedule inspections of work.
- D. Notify Architect in advance of scheduled inspections.
- E. An electrical foreman, superintendent or other supervisor shall be in attendance for all scheduled inspections

1.5 EXAMINATION OF SITE

- A. Examine the site, determine all conditions and circumstances under which the work must be done, and make all necessary allowances for same. No additional cost to the Owner will be permitted for Contractor's failure to do so.
- B. Examine and verify specific conditions described in individual Specifications sections.
- C. Verify that utility services are available, of the correct characteristics, and in the correct locations.

1.6 INTERPRETATION OF DOCUMENTS

- A. Any discrepancies between Drawings, Specifications, Drawings and Specifications, or within Drawings and Specifications shall be promptly brought to the attention of the Owner during the bidding period. No allowance shall subsequently be made by reason of failure to have brought said discrepancies to the attention of the Owner during the bidding period or of any error on the Bidder's part.
- B. The locations of products shown on Drawings are approximate. Place the devices to eliminate all interference with above-ceiling ducts, piping, etc. Where any doubt exists, the exact location shall be determined by the Owner.
- C. All general trades and existing conditions shall be checked before installing any outlets, power wiring, etc.
- D. Equipment sizes shown on the Drawings are estimated. Before installing any wire or conduit, obtain the exact equipment requirements and install wire, conduit, or other item of the correct size for the equipment actually installed. However, wire and conduit sizes shown on the Drawings shall be taken as a minimum and shall not be reduced without written approval from the Owner.

- E. Where variances occur between the Drawings and Specifications or within either document itself, the item or arrangement of better quality, greater quality, or higher cost shall be included in the Contract Price. The Engineer will decide on the item and manner in which the work shall be installed.
- F. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions, and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange conduits, equipment, and other work generally as shown on the Contract Drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed Shop Drawings for approval in accordance with Article "Submittals" as herein after specified. The right is reserved to make reasonable changes in location of equipment, conduit/wiring, and devices, up to the time of rough-in or fabrication.
- G. Work not specifically outlined, but reasonably incidental to the completion of the work, shall be included without additional compensation from the Architect, Engineer, and Owner.
- H. Perform the work in a first-class, substantial and workmanlike manner. Any materials installed which do not present an orderly and neat workmanlike appearance shall be removed and replaced when so directed by the Engineer, at the Contractor's expense.
- I. The complete set of Architectural, Mechanical, and Electrical Drawings and Specifications apply to this work. The successful Bidder shall familiarize himself with all other related documents.

1.7 MATERIALS AND EQUIPMENT

- A. Materials and equipment installed as a permanent part of the project shall be new, unless otherwise indicated or specified, and of the specified type and quality. Existing items of equipment are being relocated and reconnected under Division 26 of these Specifications. The Contractor shall be responsible for connecting all utilities as shown on the Drawings, to equipment identified as existing.
- B. Where material or equipment is identified by proprietary name, model number and/or manufacturer furnish named item, or its equal, subject to approval by Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for available space, required arrangement, and application. Submit all data necessary to determine suitability of substituted items, for approval.
- C. The suitability of named item only has been verified. Where more than one item is named, only the first named item has been verified as suitable. Substituted items, including items other than first named shall be equal or better in quality and performance to that of specified items, and must be suitable for available space, required arrangement and application. Contractor, by providing other than the first named manufacturer, assumes responsibility for all necessary adjustments and modifications necessary for a satisfactory installation. Adjustments and modifications shall include but not be limited to electrical, structural, support, and architectural work.
- D. Substitution will not be permitted for specified items of material or equipment where noted.
- E. All items of equipment furnished shall have a service record of at least five (5) years.

1.8 ELECTRICAL WORK UNDER OTHER DIVISIONS

A. Mechanical Equipment and Systems

1. In general, power wiring and motor starting equipment for mechanical equipment and systems are furnished and installed under Electrical Division 26.
2. Certain mechanical units are furnished from the factory with starters, contactors, transformers, fuses, wiring, etc., required for fans, pumps, etc. When this equipment is supplied from the factory, the Electrical Contractor must supply power circuit(s) to the unit and a disconnecting means. Coordinate with Mechanical Contractor so that one and only one, set of starters, fuses, switches, etc., is provided and installed.
3. In general, control and interlock equipment for HVAC systems (including associated wiring, conduit, transformers, relays, contacts, etc.) is furnished under Division 23. Division 26 shall install and connect all such equipment as necessary.
4. Controls, wiring, conduit, transformers, etc., for smoke fire, and motor-operated dampers are provided under Division 23. Division 26 shall install and connect all such equipment.

B. Carefully review the Contract Documents and coordinate the electrical work under the various Divisions.

1.9 FIRE SAFE MATERIALS

- A. Unless otherwise indicated, materials and equipment shall conform to UL, NFPA and ASTM standards for fire safety with smoke and fire hazard rating not exceeding flame spread of 25 and smoke developed of 50.

1.10 REFERENCED STANDARDS, CODES AND SPECIFICATIONS

- A. Specifications, Codes and Standards listed below are included as part of this Specification, latest edition:

1. ADA - Americans with Disabilities Act
2. ANSI - American National Standards Institute
3. ASTM - American Society for Testing and Materials
4. CSA - Canadian Standards Association
5. DNREC - Delaware Department of Natural Resources and Environmental Control
6. EPA - Environmental Protection Agency
7. IBC - International Building Code
8. IEEE - Institute of Electrical and Electronics Engineers
9. NEC - National Electrical Code
10. NECA - National Electrical Contractors Association
11. NEMA - National Electrical Manufacturers Association
12. NFPA - National Fire Protection Association
13. OSHA - Occupational Safety and Health Act
14. UL - Underwriters' Laboratories

- B. Electrical construction materials shall, where a listing is normal for the particular class of material, be listed in *Electrical Construction Materials List* of the Underwriters' Laboratories, Inc. (U.L.) and shall bear the listing label. Electrical equipment shall, where a listing is normal for the particular class of equipment, be listed in the *Electrical Appliance and Utilization Equipment List* of the Underwriters' Laboratories, Inc. (U.L.) and shall bear the listing label. Materials and equipment listed and labeled as "approved for the purpose" by other nationally recognized testing laboratory, inspection agency or approved organization (such as E.T.L. or Factory Mutual) shall be acceptable.

1.11 SUBMITTALS

- A. Product Data: For items specified in Part 2 of this Section.

1.12 SUBMITTALS, REVIEW AND ACCEPTANCE

- A. Equipment, materials, installation, workmanship and arrangement of work are subject to review and acceptance. No substitution will be permitted after acceptance of equipment or materials except where such substitution is considered by the Architect, to be in best interest of Owner.
- B. After acceptance of Material and Equipment List, submit six (6) copies, or more as required under the General Conditions, of complete descriptive data for all items. Data shall consist of Specifications, data sheets, samples, capacity ratings, performance curves, operating characteristics, catalog cuts, dimensional drawings, wiring diagrams, installation instructions, and any other information necessary to indicate complete compliance with Contract Documents. Edit submittal data specifically for application to this project.
- C. Thoroughly review and stamp all submittals to indicate compliance with contract requirements prior to submission. Coordinate installation requirements and any electrical requirements for equipment submitted. Contractor shall be responsible for correctness of all submittals.
- D. Submittals will be reviewed for general compliance with design concept in accordance with Contract Documents, but dimensions, quantities, or other details will not be verified.
- E. Identify submittals, indicating intended application, location and service of submitted items. Refer to Specification sections or paragraphs and Drawings where applicable. Clearly indicate exact type, model number, style, size and special features of proposed item. Submittals of a general nature will not be acceptable. For substituted items, clearly list on the first page of the submittal all differences between the specified item and the proposed item. The Contractor shall be responsible for corrective action and maintaining the Specification requirements if differences have not been clearly indicated in the submittal.
- F. Submit actual operating conditions or characteristics for all equipment where required capacities are indicated. Factory order forms showing only required capacities will not be acceptable. Call attention, in writing, to deviation from contract requirements.
- G. Acceptance will not constitute waiver of contract requirements unless deviations are specifically indicated and clearly noted. Use only final or corrected submittals and data prior to fabrication and/or installation.
- H. For any submittal requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold Contractor's funds by a

change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return of any reason.

1.13 SHOP DRAWINGS

- A. Prepare and submit Shop Drawings for all electrical equipment, specially fabricated items, modifications to standard items, specially designed systems where detailed design is not shown on the Contract Drawings, or where the proposed installation differs from that shown on Contract Drawings.
- B. Submit Product Data and Shop Drawings including but not limited to the list below, in addition to provisions of the paragraph above. Identify all shop drawings by the name of the item and system and the applicable Specification paragraph number and Drawing number.
- C. Every submittal including, but not limited to the list below, shall be forwarded with its own transmittal as a separate, distinct shop drawing. Grouping of items/systems that are not related shall be unacceptable.

Items and Systems

- 1. Conductors and Cables - 600V or Less
 - 2. Conduit and Raceway
 - 3. Equipment Nameplates/Labels
 - 4. Firestopping Materials
 - 5. Foam Duct Sealant
 - 6. Hangers and Supports
 - 7. Identification Products
 - 8. Junction and Pull Boxes, Standard Sizes
 - 9. Lamps
 - 10. Lighting Fixtures, Interior
 - 11. Operation and Maintenance Manual
 - 12. Outlet and Device Boxes
 - 13. Panelboard Circuit Directories
 - 14. Panelboards
 - 15. Receptacles
 - 16. Record Drawings
 - 17. Sleeves
 - 18. Surface Metal Raceway
 - 19. Tests and Reports
 - 20. Toggle/Snap Switches
 - 21. Wiring Diagrams
- D. Submittals shall include, but not be limited to, the following information: size, type, functional characteristics, compliance with standards in Division 26, required service access which shall be suitable for intended location and use, electrical service connections and requirements, and deviations from Contract Document requirements.
 - E. Submit for approval any other shop drawings as required by the Architect, Engineer, or Owner. No item listed above shall be delivered to the site, or installed, until approved. After the proposed materials have been approved, no substitution will be permitted except where approved by the Engineer.

- F. Submit for approval schematic diagrams of each electrical system installed in the building. Diagrams shall indicate device location, service, type, make, model number and the identification number of each device in the particular system.
- G. For any shop drawing requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold Contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return for any reason.
- H. Prepare and submit a detailed schedule of values indicating the Contract costs for the major work items. Provide additional detail and information as requested by the Engineer.

1.14 DEFINITIONS

- A. *Approve*: To permit use of material, equipment or methods conditional upon compliance with contract documents requirements.
- B. *Building Line*: Exterior wall of building.
- C. *Concealed*: Hidden from sight in chases, formed spaces, shafts, hung ceilings, embedded in construction or in crawl space or attic.
- D. *Conduits* include conduit, all fittings, identification, and other accessories relative to such conduit.
- E. *Contractor*: The Electrical Contractor and any of his subcontractors, vendors, suppliers, or fabricators.
- F. *EPDM*: Ethylene-propylene-diene terpolymer rubber
- G. *Exposed*: Not installed underground or *concealed* as defined above.
- H. *Finished Spaces*: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceiling, unexcavated spaces, crawl spaces, and tunnels.
- I. *Furnish and install or provide*: To supply, erect, install, and connect to complete for readiness for regular operation, the particular work referred to.
- J. *Location, Damp*: Locations protected from water and not subject to saturation with water or other liquids, but subject to moderate degrees of moisture. Examples of such locations include interior locations such as basements, crawlspaces, attics, cold-storage rooms, etc...
- K. *Location, Dry*: A location not normally subject to dampness or wetness. A dry location may temporarily be subject to dampness or wetness during building construction.
- L. *Location, Wet*: Locations subject to saturation with water or other liquids, locations exposed to weather, and installations underground or in concrete slabs or masonry in direct contact with the Earth. Examples of such locations include all exterior locations (including those under canopies, roofed open porches, etc...) commercial kitchens, and vehicle washing areas.

- M. *NBR*: Acrylonitrile-butadiene rubber.
- N. *Review*: Limited observation or checking to ascertain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.

1.15 RECORD DRAWINGS

- A. Upon completion of the electrical installations, the Contractor shall deliver to the Architect one complete set of prints of the electrical Contract Drawings which shall be legibly marked in red pencil to show all changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings.
- B. Contractor shall incorporate all sketches, addendums, value engineering, change orders, etc., into record drawings prior to delivering the same to the Architect.

1.16 WARRANTY

- A. Contractor's attention is directed to warranty obligations contained in the General Conditions.
- B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of equipment manufacturer's warranties shall be included in the operations and maintenance manuals.
- C. The Contractor guarantees for a two year period from the time of final acceptance by the Owner:
 - 1. That the work contains no faulty or imperfect material or equipment or any imperfect, careless, or unskilled workmanship.
 - 2. That all work, equipment, machines, devices, etc. shall be adequate for the use to which they are intended, and shall operate with ordinary care and attention in a satisfactory and efficient manner.
 - 3. That the Contractor will re-execute, correct, repair, or remove and replace with proper work, without cost to the Owner, any work found to be deficient. The Contractor shall also make good all damages caused to their work or materials in the process of complying with this section.
 - 4. That the entire work shall be water-tight and leak-proof.

1.17 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall have prepared three (3) copies of the Operation and Maintenance Manual and deliver these copies of the manual to the Owner. The manual shall be as specified herein. The manual must be approved and will not be accepted as final until so stamped.
- B. The manual shall be bound in a three-ring loose-leaf binder similar to National No. 3881 with the following title lettered on the front: *Operation and Maintenance Manual – Delaware State Police Troop #1 Modifications - Electrical*. No sheets larger than 8-1/2 inches x 11 inches shall

be used, except sheets that are neatly folded to 8-1/2 inches x 11 inches and used as a pull-out. Provide divider tabs and table of contents for organizing and separating information.

- C. Provide the following data in the manual:
1. As first entry, an approved letter indicating the starting/ending time of Contractor's warranty period.
 2. Maintenance operation and lubrication instructions on each piece of equipment furnished.
 3. Complete catalog data on each piece of electrical equipment furnished including approved Shop Drawing/Submittal with Engineer's Comments (if any).
 4. Manufacturer's extended limited warranties on equipment.
 5. Provide sales and authorized service representatives names, address, and phone numbers of all equipment and subcontractors.
 6. Provide supplier and subcontractor's names, address, and phone number.
 7. Catalog data of all equipment, starters, etc. shall include wiring diagrams, parts list and assembly drawing.
 8. Access panel charts with index illustrating the location and purpose of access panels.
 9. Approved Electrical Certificates.
 10. Start-up reports for equipment.
- D. Submit Operation and Maintenance Manual prior to anticipated date of Substantial Completion for Engineer review and approval. Substantial Completion requires that Operation and Maintenance Manuals be reviewed and approved.
- E. Deliver all instruction materials to the Owner prior to the formal instruction period.
- F. Upon completion of all work, thoroughly instruct the Owner's representatives in the proper operation and maintenance of all electrical equipment and systems.
- G. Instructions shall be done only after completed systems have been put into operation and tested for proper operation and performance.
- H. Instructions shall be given only by experts in the equipment or system and shall include descriptions and demonstrations of procedures of operation, data record keeping, etc.
- I. Furnish the necessary technicians, skilled workers, and helpers to operate the electrical systems and equipment of the entire project for one 4-hour day.
- J. Where specified in technical sections, provide longer periods required for specialized equipment.

- K. Instruct the Owner or designated personnel in operation, maintenance, lubrication, and adjustment of systems and equipment.
- L. The Operation and Maintenance Manual shall be available at the time of the instructions, for use by Instructors and Owner personnel.
- M. Schedule the general and specialized instruction periods for a time agreed upon by the Owner and Engineer.

PART 2 PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 FOAM DUCT SEALANT

- A. Description: Two-part, high-expansion foam duct sealant to keep water, acids, dust, gases, insects and rodents out of ducts (conduits).
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. American Polywater Corporation
- C. Basis of Design: FST Foam Sealant by American Polywater Corporation.
- D. The foam duct sealant shall be a two-part "blown" urethane foam with 98% closed cell content.
- E. The foam duct sealant shall have a compressive strength of 300 pounds (ASTM D1691), a tensile strength of 250 pounds (ASTM D1623), and a flexural strength of 450 pounds (ASTM D790).
- F. The foam duct sealant shall be compatible with common cable jacket materials. The cured foam shall be an inert solid that does not affect jacket materials.
- G. The foam duct sealant shall withstand temperatures from -20 degrees Fahrenheit to 200 degrees Fahrenheit and shall not lose function in direct sunlight

- H. The foam duct sealant shall be chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons.
- I. The foam duct sealant shall foam and react in five to ten minutes at 70 degrees Fahrenheit.
- J. When installed, the sealant shall be capable of holding 7.25 psi air pressure continuously (equivalent of 16.4 feet water-head pressure).

PART 3 EXECUTION

3.1 TEMPORARY FACILITIES:

- A. General: Refer to the Division 01 Sections for general requirements of temporary facilities.
- B. Description: Exact requirements for temporary service will be determined by the General Contractor.
- C. Attention is directed to the Occupational Safety and Health Act (OSHA), Americans with Disabilities Act (ADA) and National Electrical Code (NEC) requirements for electrical work on construction sites.
- D. Provide temporary construction power.
- E. Remove all temporary power installations and connections after permanent power is established and/or prior to completion of the project.

3.2 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Install equipment with working space and dedicated space in strict accordance with 2011 NEC Article 110.26.
- E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- F. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- G. Verify exact electrical service requirements for each piece of equipment receiving electrical connections. Provide proper service for each.

- H. Include any and all items required by the National Electrical Code and/or field conditions for the proper connection and installation of each piece of equipment.
- I. Right of Way: Give to piping systems installed at a required slope.
- J. Coordinate electrical work with architectural items and equipment by others. Typical equipment refers to, but is not limited to, the following:
 - 1. Countertops, Casework and Cabinets.
 - a. Do not install outlets, switches, etc., behind casework, cabinets, etc.
 - b. Coordinate counter top outlets with drilling of casework/counters.
 - c. Coordinate surface raceways and outlets above and below counters with approved casework shop drawings to avoid conflicts with sinks and other appurtenances.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetration unless core-drilled holes or formed openings are used.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
- F. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- G. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
- H. Fire-Rated Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements of Division 26 Section "Electrical Firestopping".

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 26 Section, "Electrical Firestopping".

3.5 SUPPORTS, HANGERS AND FOUNDATIONS

- A. Provide supports, hangers, braces, attachments and foundations required for the work. Support and set the work in a thoroughly substantial and workmanlike manner without placing strains on

materials, equipment, or building structure, submit shop drawings for approval. Coordinate all work with the requirements of the structural division.

- B. Supports, hangers, braces, and attachments shall be standard manufactured items or fabricated structural steel shapes. All interior hangers shall be galvanized or steel with rust inhibiting paint. All exterior hangers shall be constructed of stainless steel utilizing stainless steel rods, nuts, washers, bolts, etc.

3.6 PROVISIONS FOR ACCESS

- A. The Contractor shall provide access panels and doors for all concealed equipment, and other devices requiring maintenance, service, adjustment or manual operation.
- B. Where access doors are necessary, furnish and install manufactured painted steel door assemblies consisting of hinged door, key locks, and frame designed for the particular wall or ceiling construction. Properly locate each door. Door sizes shall be a 12 inches x 12 inches for hand access, 18 inches x 18 inches for shoulder access and 24 inches x 24 inches for full body access where required. Review locations and sizes with Architect prior to fabrication. Provide U.L. approved and labeled access doors where installed in fire rated walls or ceilings. Doors shall be Milcor Metal Access Doors as manufactured by Inland-Ryerson, Mifab, or approved equal.
 - 1. Acoustical or Cement Plaster: Style B
 - 2. Hard Finish Plaster: Style K or L
 - 3. Masonry or Dry Wall: Style M
- C. Where access is by means of liftout ceiling tiles or panels, mark each ceiling grid using small color-coded and numbered tabs. Provide a chart or index for identification. Place markers within ceiling grid not on ceiling tiles.
- D. Access panels, doors, etc described herein shall be furnished under the section of Specifications providing the particular service and to be turned over to the pertinent trade for installation. Coordinate installation with installing Contractor. All access doors shall be painted in baked enamel finish to match ceiling or wall finish.
- E. Access panels in security or detention areas shall be security type.
- F. Submit shop drawings indicating the proposed location of all access panels/doors. Access doors in finished spaces shall be coordinated with air devices, lighting and sprinklers to provide a neat and symmetrical appearance.
- G. Provide sufficient access and working space for repair and maintenance about all lighting and electrical equipment to permit ready and safe operation and maintenance of such equipment OSHA 29 CFR 1910 Subpart D and 1910.303(g).

3.7 PAINTING AND FINISHES

- A. Provide protective finishes on all materials and equipment. Use coated or corrosion-resistant materials, hardware and fittings throughout the work. Paint bare, untreated ferrous surfaces with rust-inhibiting paint. All exterior components including supports, hangers, nuts, bolts, washers, vibration isolators, etc. shall be stainless steel.

- B. Clean surfaces prior to application of insulation, adhesives, coatings, paint, or other finishes.
- C. Provide factory-applied finishes where specified. Unless otherwise indicated factory-applied paints shall be baked enamel with proper pretreatment.
- D. Protect all finishes and restore any finishes damaged as a result of work under Division 26 to their original condition.
- E. The preceding requirements apply to all work, whether exposed or concealed, as defined herein.
- F. Remove all construction marking and writing from exposed equipment, ductwork, piping and building surfaces. Do not paint manufacturer's labels or tags.
- G. All exterior equipment and conduits shall be painted to match adjacent surface in color as selected by Architect, unless otherwise indicated by the Architect.
- H. All exposed conduit, boxes, equipment, etc. in finished spaces shall be painted. Colors shall be as selected by the Architect and conform to ANSI Standards.

3.8 COLOR SELECTION

- A. Color of finishes shall be as selected by the Architect.

3.9 PROTECTION OF WORK

- A. Protect work, material and equipment from weather and construction operations before and after installation. Properly store and handle all materials and equipment.
- B. Cover temporary openings in conduits and equipment to prevent the entrance of water, dirt, debris, or other foreign matter. Deliver conduits with factory applied end caps.
- C. Cover or otherwise protect all finishes.
- D. Replace damaged materials, devices, finishes and equipment.
- E. Protect stored conduits from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, where stored inside.

3.10 OPERATION OF EQUIPMENT

- A. Clean all systems and equipment prior to initial operation for testing, or other purposes. Lubricate, adjust, and test all equipment in accordance with manufacturer's instructions. Do not operate equipment unless all proper safety devices or controls are operational. Provide all maintenance and service for equipment that is authorized for operation during construction.
- B. Submit factory start-up sheets or field start-ups sheets for all equipment prior to the commencement of testing.
- C. Do not use electrical systems for temporary services or during construction, unless approved by Owner in writing. Refer to Division 01 Section "Temporary Facilities and Controls".

- D. Upon completion of work, clean and restore all equipment to new conditions; replace expendable items.

3.11 TESTING AND ADJUSTMENT

- A. Perform all tests which are specified or required to demonstrate that the work is installed and operating properly. Where formal tests are required, give proper notices and perform all necessary preliminary tests to assure that the work is complete and ready for final test.
- B. Adjust all systems, equipment and controls to operate in a safe, efficient and stable manner.
- C. On all circuits, 600 volts or less, provide circuits that are free from ground faults, short circuits and open circuits.
- D. Other tests of a specific nature for special equipment shall be as specified under the respective equipment.
- E. Submit all test results to the Architect for approval.

3.12 WALL AND FLOOR PENETRATIONS

- A. All penetrations of partitions, ceilings, and floors by conduit under Division 26 shall be sleeved, sealed, and caulked airtight for sound and air transfer control. Penetrations of mechanical room partitions, ceilings, and floors shall be as specified in Division 26.
- B. All penetrations of fire rated assemblies shall be sleeved, sealed, caulked and protected to maintain the rating of the wall, roof, or floor. Fire Marshal approved U.L. assemblies shall be utilized. See Division 26 Section, "Electrical Firestopping".
- C. Conduit sleeves:
 - 1. Galvanized steel pipe, standard weight where pipes are exposed and roofs and concrete and masonry walls.
 - 2. Twenty two (22) gauge galvanized steel elsewhere.

3.13 EQUIPMENT BY OTHERS

- A. This Contractor shall make all system connections required to equipment furnished and installed under other divisions or furnished by the Owner. Connections shall be complete in all respects to render this equipment functional to its fullest intent.
- B. It shall be the responsibility of the supplier of the equipment to furnish complete instructions for connections. Failure to do so will not relieve the Contractor of any responsibility for improper equipment operation.

3.14 PHASING

- A. Refer to Architectural Specifications and Contract Drawings for any required phasing.

- B. Maintain building egress and traffic ways at all times. Coordinate egress requirements with the State Fire Marshal, the Owner and Authorities Having Jurisdiction (AHJ).
- C. Provide dust barriers/partitions, penetration closures, etc, to ensure safety of building occupants and protection of existing surroundings.
- D. The Building shall remain watertight at all times.
- E. Refer to phasing plans for additional requirements.
- F. Within thirty days of Award of Contract, the Contractor shall submit a minimum of six (6) copies of the proposed Phasing Plan (Drawings and detailed written description) to the Architect for review and approval based on the general and specific requirements indicated on the Drawings and Specifications. The phasing plan shall reflect the work of all trades. The phasing plan shall be updated as often as needed (i.e. major deviations and/or modified sequence of events) and reviewed during each progress meeting so the facility and Architect can be aware of the areas of construction and progress as it relates to the approved schedule.
- G. While work is in progress, except for designated short intervals during which connections are made, continuity of service shall be maintained to all existing systems. Interruptions shall be coordinated with the Owner as to time and duration. The Contractor shall be responsible for any interruptions to service and shall repair any damages to existing systems caused by his operations.

3.15 OUTAGES

- A. Provide a minimum of fourteen (14) days notice to schedule outages. The Contractor shall include in their bid outages and/or work in occupied areas to occur on weekends, holidays, or at night. Coordinate and get approval of all outages with the Owner.
- B. Submit *Outage Request Form*, attached at the end of this Section, to Owner for approval.

3.16 CUTTING AND PATCHING

- A. Accomplish all cutting and patching necessary for the installation of work under Division 26. Damage resulting from this work to other work already in place, shall be repaired at Contractor's expense. Where cutting is required, perform work in neat and workmanlike manner. Restore disturbed work to match and blend with existing construction and finish, using materials compatible with the original. Use mechanics skilled in the particular trades required.
- B. Do not cut structural members without approval from the Architect or Engineer.

3.17 PENETRATION OF WATERPROOF CONSTRUCTION

- A. Coordinate the work to minimize penetration of waterproof construction, including roofs, exterior walls, and interior waterproof construction. Where such penetrations are necessary, furnish and install all necessary curbs, sleeves, flashings, fittings and caulking to make penetrations absolutely watertight.
- B. Where conduits penetrate roofs, flash pipe with Stoneman *Stormtite*, Pate or approved equal, roof flashing assemblies with skirt and caulked counter flashing sleeve.

- C. Furnish and install pitch pockets or weather tight curb assemblies where required.
- D. Furnish and install curbs, vent assemblies, and sleeves specifically designed for application to the particular roof construction, and install in accordance with the manufacturer's instructions. The Contractor shall be responsible for sleeve sizes and locations. All roof penetrations shall be installed in accordance with manufacturer's instructions, the National Roofing Contractors Association, SMACNA, and as required by other divisions of these Specifications.

3.18 CONNECTIONS AND ALTERATIONS TO EXISTING WORK

- A. Unless otherwise noted on the Drawings, where existing electrical work is removed, including hangers, to a point below finished floors or behind finished walls and capped, such point shall be far enough behind finished surfaces to allow for installation of normal thickness of required finish material.
- B. Where work specified in Division 26 connects to existing equipment, conduits, etc., Contractor shall perform all necessary alterations, cuttings, fittings, etc. of existing work as may be necessary to make satisfactory connections between new and existing work, and to leave completed work in a finished and workmanlike condition.
- C. Where the work specified under Division 26, or under other Divisions, requires relocation of existing equipment, conduit etc., Contractor shall perform all work and make necessary changes to existing work as may be required to leave completed work in a finished and workmanlike condition.
- D. Where the relocation of existing equipment is required for access or the installation of new equipment, the Contractor shall temporarily remove and/or relocate and re-install as required to leave the existing and new work in a finished and workman like condition.

3.19 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
 - 5. To provide working space and dedicated space clearances per 2008 NEC Article 110.26.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified herein.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 26 Section "Electrical Firestopping".

3.20 DEMOLITION

- A. Unless otherwise noted all existing equipment, conduit, wire, etc., shall remain.
- B. Where existing equipment is indicated to be removed, all associated conduit, power, controls, insulation, hangers, supports and housekeeping pads, etc..., shall also be removed. Patch, paint and repair walls/roof/floor to match existing and/or new finishes.
- C. The Contractor shall be responsible for visiting the site and determining the existing conditions in which the work is to be performed.
- D. Where any abandoned conduits in existing floors, walls, pipe tunnels, ceilings, etc., conflict with new work, remove abandoned conduits as necessary to accommodate new work.
- E. The location of all existing equipment, conduits etc., indicated is approximate only and shall be checked and verified. Provide all new electrical work required to connect to or clear existing work as applicable.
- F. Maintain egress at all times. Coordinate egress requirements with the State Fire Marshal, the Owner and the Authority(ies) Having Jurisdiction (AHJ).
- G. Where required to maintain the existing systems in operation, temporarily backfeed existing systems from new equipment. Contractor shall temporarily extend existing conduit systems to new conduit systems.
- H. At completion of project all temporary conduit, wires, etc., shall be removed in their entirety.
- I. Existing conduit, equipment, wiring, etc., not required for re-use or re-installation in this project, shall be removed from the project site.
- J. Deliver to the Owner, on the premises where directed, existing equipment and materials which are removed and which are desired by the Owner or are indicated to remain the property of the Owner.
- K. All other materials and equipment which are removed shall become property of the Contractor and shall be promptly removed, from the premises, and disposed of by the Contractor, in an approved manner. Contractor shall be responsible for proper disposal of all removed equipment containing PCB's.
- L. Where conduit and wiring are removed, remove all conduit hangers which were supporting the removed conduit. Patch the remaining penetration voids with like materials and paint to match existing construction.

- M. Where required, provide and coordinate removal and re-installation of existing equipment. Take care to protect materials and equipment indicated for reuse. Contractor shall repair or replace items which are damaged. Contractor shall have Owner's representative present to confirm condition of equipment prior to demolition.
- N. Before demolition begins, and in the presence of the Owners representative, test and note all deficiencies in all existing systems affected by demolition but not completely removed by demolition. Provide a copy of the list of system deficiencies to the Owner and the Engineer. Videotape existing conditions in each space prior to beginning demolition work.
- O. The Owner shall have the first right of refusal for all fixtures, devices and equipment removed by the Contractor.
- P. All devices and equipment designated by the Owner to remain the property of the Owner shall be moved and stored by the Contractor at a location on site as designated by the Owner. It shall be the Contractor's responsibility to store all devices and equipment in a safe manner to prevent damage while stored.
- Q. All existing equipment refused by the Owner shall become the property of the Contractor and shall be removed from the site by the Contractor in a timely manner and disposed of in a legal manner.
- R. Work Abandoned in Place: Cut and remove conduit a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.
- S. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.
- T. Terminate services and utilities in accordance with local laws, ordinances, rules and regulations.

END OF SECTION

OUTAGE REQUEST FORM

DATE APPLIED: _____ BY: _____

DATE FOR OUTAGE: _____ FIRM: _____

START OUTAGE-TIME: _____ DATE: _____

END OUTAGE - TIME: _____ DATE: _____

AREAS AND ROOMS: _____

FLOOR(S): _____

AREA(S): _____

ROOM(S): _____

WORK TO BE PERFORMED: _____

SYSTEM(S): _____

REQUEST APPROVED BY: _____
(FOREMAN OR OTHER PERSON IN CHARGE)

(FOR OWNER'S USE ONLY):

APPROVED: _____

YES ___ NO ___ BY: _____ DATE: _____

DATE/TIME-AS REQUESTED: _____ OTHER : _____

OWNER'S PRESENCE REQUIRED: _____

YES: ___ NO: ___ NAME: _____

POINT OF CONTACT: _____ PHONE: _____

CANNOT BE USED FOR BIDDING.

**DIVISION 26
SECTION 26 05 02
ELECTRICAL DEMOLITION FOR REMODELING
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CANNOT BE USED FOR BIDDING.

SECTION 26 05 02 - ELECTRICAL DEMOLITION FOR REMODELING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE

- A. Provide all demolition of existing electrical equipment including all conduit and wiring as required by the Contract Documents. Electrical demolition shall be performed in accordance with the Contract Documents.
- B. Provide all cutting and patching for electrical construction.
- C. Provide temporary service and provisions to maintain existing systems.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements and circuiting arrangements are as shown on the Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Verify whether or not PCB ballasts exist in light fixtures which will be disposed of. If PCB light fixture ballasts exist, then follow requirements in "PCB Ballast Handling and Disposal", included in this Section.
- D. Demolition Drawings are based on casual field observation. Report discrepancies to the Owner, and Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Disconnect and make electrically safe electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages and removal with the Owner, Architect, and other trades.

3.3 CONNECTIONS AND ALTERATIONS TO EXISTING SYSTEMS

- A. Keep all existing electrical systems in operation during the progress of the work. Provide temporary electrical connections to systems of equipment, etc., where necessary to maintain continuous operation until the new systems and equipment are ready for operation.
- B. When existing electrical work is removed, remove all conduit, ducts, supports, etc. to a point below the finished floors or behind finished walls and cap. Such points shall be far enough behind finished surfaces to allow for the installation of the normal thickness of finished material.
- C. When the work specified hereunder connects to any existing equipment, conduit, wiring, etc., perform all necessary alterations, cuttings, fittings, etc., of the existing work as may be necessary or required to make satisfactory connections between the new and existing work and leave the complete work in a finished and workmanlike condition.
- D. When the work specified under other divisions necessitates relocation of existing equipment, conduits, wiring, etc., perform all work and make all necessary changes to existing work as may be required to leave the completed work in a finished and workmanlike condition.
- E. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. In particular, all security and safety systems must be maintained in operation at all times as required by the Owner. This includes security, safety lighting, and fire alarm systems.
- F. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner, Architect and other trades at the site at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- G. Existing Fire Alarm System: Maintain existing system in service. Disable system only to make switchovers and connections. Notify Owner, Architect and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- H. Trace all circuits and controls to be disconnected to ensure that vital services to other areas are not interrupted.

3.4 PROTECTION

- A. Provide protection for all existing and new cabling. Provide innerduct, conduit or other suitable means of protection to prevent damage to cables located in renovated areas.
- B. Damage to wiring, cabling or equipment shall be repaired by skilled mechanics for the trade involved at no additional contract amount.
- C. Fixtures, materials and equipment shall be protected at all times. The Contractor shall make

good any damage caused either directly or indirectly by his workmen. Conduit openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or other injury. At the completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned and turned over in a condition satisfactory to the Owner.

- D. Damage: Where wiring, raceways, lighting fixtures, devices or equipment to remain is inadvertently damaged or disturbed, cut out and remove damaged section and provide new of equal or capacity or quality.

3.5 ELECTRICAL DEMOLITION

- A. Remove from the premises and dispose of all existing wiring, conduit, material, fixtures, devices, equipment, etc., not required for re-use or re-installation.
- B. Deliver on the premises where directed existing material and equipment which is removed and is desired by the Owner or is indicated to remain the property of the Owner.
- C. All other equipment and materials which are removed shall become the property of the demolisher and shall be removed by him from the premises.
- D. Where electrical equipment is removed, also remove all wiring back to source panelboard or switch or to last remaining device on the same circuit. All conduit, hangers, supports, etc., shall also be removed unless otherwise noted. Such conduit may remain to be reused for new work provided said conduit is of the proper size and type as that specified and in a condition acceptable to Engineer and Owner.
- E. Any conduit abandoned in concrete slabs, walls, or other inaccessible locations shall be left empty except for a nylon pull wire. Ends shall be capped with push plugs for future use.

3.6 EXISTING CONDUIT 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. Abandoned Work: Concealed electrical work abandoned in place, shall be cut out approximately 2 inches beyond the face of adjacent construction, capped and the adjacent surface patched to match the existing finish.
- D. Disconnect abandoned outlet boxes and remove devices. Remove abandoned outlet boxes if raceway servicing them is abandoned and removed. Provide blank cover for abandoned outlet boxes which are not removed.
- E. Ensure access to existing boxes and other installations which remain active and which require access. Modify installation or provide access panel as appropriate.
- F. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

- G. Clean and repair existing raceway and boxes which remain or are to be reinstalled.
- H. Remove all abandoned wiring from existing conduits and ductbanks. Abandoned wiring that cannot be removed shall be tagged at each end as "Abandoned".
- I. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors and patch surfaces.

3.7 EXISTING WIRING AND CABLING WORK

- A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes if wire and cable servicing them is abandoned and removed. Provide blank cover for abandoned boxes which are not removed.
- C. Ensure access to existing wiring connections which remain active and which require access. Modify installation or provide access panel as appropriate.
- D. Extend existing circuits using materials and methods compatible with existing electrical installations or as specified.
- E. Clean and repair existing wire and cable which remain or is to be reinstalled.

3.8 EXISTING WIRING DEVICES WORK

- A. Disconnect abandoned wiring devices and remove them.
- B. Ensure access to existing wiring devices which remain active. Modify installation as appropriate.
- C. Clean and repair existing wiring devices which remain or are to be reinstalled.
- D. Provide painted blank coverplates over existing device boxes. Paint shall match existing finish of surrounding area.
- E. Disconnect abandoned wiring devices and remove devices. Remove abandoned outlet boxes if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlet boxes which are not removed.

3.9 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work to meet all requirements of these specifications.
- B. If certain raceways and boxes are abandoned but not scheduled for removal, those items must be shown on the As-Built Drawings.

- C. Remove, relocate, and extend existing installations to accommodate new construction.
- D. Remove abandoned wiring to source of supply.
- E. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- H. Extend existing installations using materials and methods (compatible with existing electrical installations, or) as specified. This includes the extension of the circuit from the last active device to the next device in the system to be activated.

3.10 LAMP HANDLING AND DISPOSAL

- A. It is the responsibility of the Contractor to properly handle and dispose of all contaminated lamps. All lamps (fluorescent, incandescent, and HID) contain mercury and/or lead (in the base) as well as other heavy metals and compounds which are regulated by the EPA and DNR during the disposal process. As a result, regulations have been issued covering the handling and disposal of all lamps. Therefore, lamps which have been removed from service for disposal shall be handled as follows.
 - 1. Very carefully remove all lamps (fluorescent, incandescent and HID) from light fixtures before removal of the fixture from its mounted position. This is to reduce the likelihood that the lamp(s) will be broken.
 - 2. Removed lamps shall be placed in containers and placed in storage in a location on the Owner's property (this may be in another building) arranged by the Owner's field representative. Label the area as *Hazardous Material Storage – Mercury*.
 - 3. Provide to the Owner's field representative, in written form, a count of all stored lamps by type at the completion of the project.
 - 4. The Contractor will have the responsibility to dispose of all contaminated lamps as required by EPA and DNR Rules and Regulations.
 - 5. Provide to the Owner's Representative copies of all documents including manifests, certificates, etc. that show the handling, transportation, delivery and disposal of stored lamp materials identified above.

3.11 PCB BALLAST HANDLING AND DISPOSAL

- A. It is the Contractor's responsibility to properly handle and dispose of contaminated ballasts. Generally, all high power factor fluorescent light ballasts manufactured before 1978 and some HID ballasts contain PCB compounds in their capacitors. The Contractor shall inspect all ballasts in light fixtures (which will become the property of the Contractor and will be

removed from the project site as part of this project). The handling, removal and disposal of all PCB contaminated ballasts shall be the Contractors responsibility. The Contractor shall take the actions described below.

1. All ballasts labeled as NON PCBs or NO PCBs shall become the property of the Contractor. If the PCB content is *not* stated on the ballast label, the ballast shall be handled as a PCB ballast.
2. All PCB ballasts shall be removed from the light fixtures and shall have the wires clipped off. However, before removal, all PCB ballasts shall be carefully inspected for leaks. If a ballast appears to be leaking (evidenced by potting compound leaking out or by an oily film on the ballast surface) the ballast must be handled per EPA and DNR PCB regulations. Basically, this means the ballast is to be carefully removed from the fixture and placed in an approved drum. The person removing the ballast from the fixture shall wear protective gloves, eye protection, and protective clothing as necessary.
3. If the fixture has also been contaminated, it must be cleaned to less than 10 micrograms/100 square centimeters contamination before disposal. This cleaning must be done by an approved PCB Contractor and is not considered a part of this contract.
4. The ballasts shall then be placed in US DOT approved Type 17C or Type 17H drums (barrels). Fifty-five gallon and 30 gallon drums are available from most drum suppliers. The quantity and size of the drums will be determined at the time of construction.
5. These barrels shall be placed in storage with the cover that came with the barrels, in a location within a building, as designated by the Owner's project representative. The barrels are *not* to be placed outside where they are exposed to weather.
6. THESE BALLASTS ARE NOT TO BE REMOVED FROM THE WORK SITE . To do so, would be a violation of DNR and DOT hazardous waste regulations and may result in a fine.
7. Label and mark the PCB storage drums with EPA-approved PCB labels and the storage area with signs, marks, and lines to meet the regulations of Code.
8. Provide approved PCB-absorbent materials to be stored immediately adjacent to the drum storage area. Do not place loose absorbent material in the drums.
9. Provide to the Owner's project representative, in written form, a total count of these ballasts (or their total weight by barrel) and where they are stored.
10. The Contractor will have the responsibility to dispose of all contaminated ballasts as required by EPA and DNR Rules and Regulations.
11. Provide to the Owner's Representative copies of all documents including manifests, certificates, etc. that show the handling, transportation, delivery and disposal of stored ballast materials identified above.

3.12 CLEANING AND REPAIR

- A. Clean and repair existing equipment and materials that remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.13 INSTALLATION

- A. Install relocated materials and equipment under the provisions of other related Sections.

END OF SECTION

CANNOT BE USED FOR BIDDING.

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SECTION 26 05 19
CONDUCTORS AND CABLES
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SECTION 26 05 19 - CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

- A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Indicate procedures and values obtained
- B. Product Data: Provide for each cable assembly type, wire, cables, conductors, and connectors.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
- D. Project Record Documents: Record actual locations of components and circuits.

1.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
 - 1. The Terms *Listed and Labeled*: As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A *Nationally Recognized Testing Laboratory* as defined in OSHA Regulation 1910.7.
- B. Comply with NEMA/Insulated Cable Engineers Association (ICEA) Standards.
- C. Comply with NECA Standard of Installation.
- D. Comply with NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- E. American Society for Testing and Materials (ASTM): Comply with requirements of the following:
 - 1. B3: Standard Specification for Soft or Annealed Copper Wire

2. B8: Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 3. D753: Standard Specification for General Purpose Polychloroprene Jacket for Wire and Cable
- F. Electrical Testing Laboratories (ETL): Provide wiring, cabling and connector products which are ETL listed and labeled.
- G. Institute of Electrical and Electronics Engineers (IEEE): Comply with the following standards which apply to wiring systems:
1. 241: Recommended Practice for Electric Power Systems in Commercial Buildings
- H. NFPA: Comply with NFPA 70 requirements for construction, installation and color coding of electrical wire, cable and connections.
- I. National Electrical Manufacturer's Association (NEMA): Comply with requirements of the following:
1. WC70: Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
- J. UL: Provide material conforming to the following standards:
1. UL 83 - Thermoplastic-Insulated Wires and Cables.
 2. UL 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors
- K. UL Labels: Provide wiring, cabling and connector products which are UL listed and labeled.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wires and cables according to NEMA WC 26, *Binational Wire and Cable Packaging Standard*.
- B. Storage: Store wire and cable in a clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.
- C. Handling: Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

1.6 COORDINATION

- A. Coordinate layout and installation of cables with other installations.
- B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Engineer and Architect.

- C. Determine required separation between cables and other work.
- D. Determine cable routing to avoid interference with other work.

1.7 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on the Drawings.
- B. Feeder Conductor sizes are based on copper.
- C. Branch circuit conductor sizes are based on copper.
- D. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- E. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Wires and Cables:
 - a. American Insulated Wire Corp.; Leviton Manufacturing Co.
 - b. BICC Brand-Rex Company.
 - c. General Cable.
 - d. Senator Wire & Cable Company.
 - e. Southwire Company.
 - f. Colonial Wire Company.
 - 2. Connectors and Accessories for Wires and Cables:
 - a. AMP Incorporated.
 - b. Buchanan.
 - c. General Signal; O-Z/Gedney Unit.
 - d. Monogram Company; AFC.

- e. NSI Industries, Inc.
 - f. Square D Company; Anderson.
 - g. 3M Company; Electrical Products Division.
3. Metal Clad (MC) Cable
- a. Alcan Cable.
 - b. Atkore AFC Cable Systems.
 - c. Encore Wire Corporation.
 - d. General Cable.
 - e. Nexans.
 - f. Prysmian Cables and Systems.
 - g. Service Wire Company.
 - h. Southwire Company.
 - i. United Copper Industries.

2.2 BUILDING WIRES AND CABLES

- A. UL-listed building wires and cables with conductor material, insulation type, cable construction and rating as specified herein.
- B. Building wires and cables shall be annealed (soft) copper, 600 volt, Type THHN/THWN (dual-rated) single conductors rated 90°C dry / 75°C wet, with a minimum conductivity of 98 percent at 20°C (68°F), or a maximum resistivity of 1.7 micro-ohms per centimeter.
- C. Conductors shall meet or exceed requirements of all applicable ASTM specifications, UL Standard 83, UL Standard 1581, NEMA WC 70, Federal Specification A-A-59544 and shall be RoHS/REACH Compliant.
- D. Conductors shall be solid for No. 10 AWG and smaller, and stranded for No. 8 AWG and larger.
- E. Building wire and cables shall be color-coded using colors factory impregnated throughout the insulation and jacket. The following color code convention(s) shall be used except where existing systems have established another color code convention:
 - 1. 120/208-Volt, 3-Phase, 4-Wire System:
 - a. Phase A: Black

- b. Phase B: Red
- c. Phase C: Blue
- d. Neutral: White
- e. Ground: Green

2.3 CONNECTORS AND SPLICES

- A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 Article, "*Wire and Insulation Applications*".
- B. Split Bolt Connectors: Not acceptable.
- C. Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.
- D. All wire connectors used in underground or exterior pull boxes shall be gel-filled twist connectors or a connector designed for damp and wet locations.
- E. Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.
- F. Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic high conductivity copper tubing, internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.
- G. Heat shrinkable tubing shall meet the requirements of ANSI C119.1-1986 for buried connections to 90 degrees C and shall be material flame-retarded per IEEE 383 *Vertical Tray Flame Test*.
- H. Motor connection kits shall consist of heat-shrinkable, polymeric insulating material over the connection area and a high dielectric strength mastic to seal the ends against ingress of moisture and contamination. Motor connection kits shall accommodate a range of cable sizes for both in-line and stub-type configurations. Connection kits shall be independent of cable manufacturer's tolerances.
- I. Wire Nut Connectors:
 - 1. Wire nuts installed in wet locations, exterior, etc., shall be self-contained, waterproof and corrosion-proof units incorporating prefilled silicone grease to block out moisture and air.
 - 2. Connectors shall be UL listed and appropriately sized according to manufacturer's recommendation for the suitable wire sizes and voltage rating (600 volt minimum).
 - 3. Connector body shall have a color-coded outer shell.
 - 4. Connectors shall be as manufactured by Ideal Technology or approved equal.
- J. Insulated Connectors:

1. Connectors insulated with high-dielectric strength plastisol, molded for precise fit and supplied with removable access plugs over the hex screws.
2. Wire entry ports on one or both sides of the connector as required.
3. Mounting holes at each end of the connector for direct isolated mounting to wiring trough, panel or wireway.
4. UV and cold temperature rated.
5. Dual rated for use with copper and/or aluminum cables.
6. Rated 600V, 90°C.
7. Insulated connectors shall be IPLM or IPLMD Series as manufactured by Polaris, or approved equal by ILSCO, Burndy, T&B or other listed acceptable manufacturer.

2.4 METAL CLAD (MC) CABLE AND CONNECTORS

- A. Cable shall meet or exceed the requirements of UL Standard 83, UL Standard 1063, and UL Standard 1569 for Type MC cable, Federal Specification A-A59544 Vertical Cable Tray Flame Test and the National Electrical Code. Cable shall be listed for use in UL 1, 2, and 3 Hour Through-Penetration Firestop Systems.
- B. Cable shall be constructed with soft drawn copper, 600 volt, type THHN/THWN conductors rated 90°C dry/75°C wet, with a green insulated grounding conductor. Only cables with conductor sizes 12 AWG and 10 AWG shall be permitted. Conductors shall be cabled together with a binder tape bearing a print legend that is wrapped around the assembly. An aluminum interlocked armor shall be applied over the assembly. Conductors shall be protected by an anti-short bushing at each termination.
- C. Straight connectors shall be one-piece spring-steel, set screw design with nylon insulator. Provide Cable Lok XC-73D series, as manufactured by Steel City, or approved equal.
- D. 90°C connectors shall be die cast zinc, clamp type with insulated throat. Provide XC-490 series as manufactured by Steel City, or approved equal.

2.5 INSULATING TAPE, PUTTY, RESIN AND SUPPORTS

- A. Tape: Provide plastic electrical insulating tape which is flame-retardant, cold and weather-resistant. Tape for use in areas subject to temperatures 30 degrees C to 105 degrees C, or where the tape will be subjected to an oil splash, tape shall have a minimum thickness of 8.5 mils, and shall consist of an oil-resistant acrylic adhesive.
- B. Materials: Provide all insulating materials for splices and connections such as glass and synthetic tapes, putties, resins, splice cases, or compositions of the type approved for the

particular use, location, voltage and temperature and apply and install in an approved manner, all in accordance with the manufacturer's recommendations.

- C. Supports: Provide cable supports of the wedge type which firmly clamp each individual cable and tighten due to the cable weight.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. By beginning work, the Contractor has accepted conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRE AND INSULATION APPLICATIONS

- A. No branch circuit wires smaller than 12 AWG shall be used unless otherwise indicated. Conductors shall be continuous from outlet to outlet and from terminal board to point of final connection, and no splice shall be made except within outlet or junction boxes. All conductors shall be of the size indicated. All wires 8 AWG and larger shall be stranded.
- B. Control wiring shall not be less than 14 AWG and shall be color coded using colors impregnated into the insulation. All wiring, contacts, and terminal blocks shall be suitably tagged for ease in identification and tracing of circuits. Identification tags shall be engraved fiber or plastic type, subject to acceptance. Wires shall be numbered and coded, using Brady *Quicklabels* or equal.
 - 1. Wiring shall be tagged at terminations, in pull boxes, junction boxes, outlet boxes, panelboards, handholes, etc...
- C. Switch leg wire shall be labeled with "S" tag.
- D. All control wiring shall be color coded with wires of colors different from those used to designate phase wires.
- E. Wiring for general 15 and 20 amp branch circuit work shall be as follows unless otherwise indicated:

HOME RUN LENGTH AND WIRE SIZE			CIRCUIT LENGTH AND WIRE SIZE		
120 Volt			120 Volt		
0 – 60 '	-	12 AWG	0-100 '	-	12 AWG
60 – 100 '	-	10 AWG	100 & Up	-	10 AWG
100' & Up	-	8 AWG			

- F. Circuit length as given above shall be the wire length between the first and last outlet on the circuit. Home run length as given above shall be the wire length between the first outlet and the panelboard. In accordance with the above, where the size of branch circuit conductors is increased by the minimum required by the NEC for the branch circuit rating, ensure that the termination provisions of all equipment connected to such circuits are listed as suitable for the conductor sizes involved.
- G. Joints of 10 AWG and smaller shall be made with properly insulated solderless type pressure connectors. Where stranded conductors or multiple solid conductors are connected to terminals, solderless lugs manufactured by Thomas and Betts Company or equivalent shall be used.
- H. Joints of 8 AWG and larger in power and lighting circuits shall be of the type indented into the conductor by means of a hand or hydraulic pressure tool. Connectors shall be Burndy *Hy-dent*, T&B *Sta-Kon*, or equivalent. Connectors for control wiring shall be Burndy *Hy-Lug*, or equivalent.
- I. Branch circuits for lighting and power concealed above accessible/suspended ceilings and in drywall partitions may be accomplished by utilizing type MC (metal clad) cable. Cables shall be supported with appropriate hangers. Tie wire will not be accepted.
- J. All circuits for exterior electric work shall be 10 AWG (minimum) and contain an extra 10 AWG (minimum) copper grounding conductor. All exterior wiring shall be installed in conduit as specified above, unless otherwise noted on the Drawings.

3.4 INSTALLATION

- A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's *Standard of Installation*.
- B. Remove existing wires from raceway before pulling in new wires and cables.
- C. Pull Conductors: Use a UL-listed and manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

- D. Use pulling means including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway. Completely and thoroughly swab conduit system before installing conductors.
- E. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Division 26 Section, *Common Work Results for Electrical* and Division 26 Section, *Hangers and Supports*.
- G. Seal around cables penetrating fire-rated elements according to Division 26 Section *Electrical Firestopping*.
- H. Identify wires and cables according to Division 26 Section, *Electrical Identification*.
- I. Conductors installed in parallel shall be of equal lengths.
- J. Wiring at Outlets: Install with at least 12 inches (300 mm) of slack conductor at each outlet.
- K. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.
- L. The Contractor shall provide suitable installation equipment to prevent cutting and abrasion of conductor insulation. The Contractor shall use suitable cable guides, pulleys, and protective sleeving to prevent damage to cable during installation. Ropes used for pulling of wire and cable shall be made of polyethylene or other suitable non-metallic material. Pulling lines shall be attached to cable by means of either woven basket grips or pulling types attached directly to the conductors. Wire pulling lubricants, if used, shall conform to UL requirements applicable to the various insulations and raceway materials. The lubricants shall be certified by the manufacturer to be non-injurious to such insulation and materials.
- M. Each feeder cable shall be labeled at terminals and at all accessible points in equipment and in pull boxes. Each control wire shall be labeled at both ends. Labels shall be self-sticking wire markers.
- N. For rubber and plastic-covered wire and cable, pulling compound Ideal Yellow 77 may be used.
- O. Terminal lugs for wires 8 AWG and larger shall be T&B 54,000 Series or Burndy *HY-Dent*, compression type, unless noted otherwise. One-hole lugs for wires 4/0 AWG and smaller. Two-hole lugs for all sizes wires 250 kcmil AWG and larger.
- P. Install wires and cables using braided rope larger than the cable being pulled to keep twists to a minimum.
- Q. Provide an insulated green equipment grounding conductor (EGC), sized per NEC, for all feeder and branch circuits, shown or not shown.

- R. Install electrical cables, wires, and connectors as indicated in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- S. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.
- T. Conductors installed in runs within 6 inches of heating pipes or equipment shall be type AVA.
- U. No conductors shall be drawn into conduit until all work, which may cause cable damage, is completed.
- V. All wiring in fluorescent fixture channels, over boilers and breechings, and in other high ambient temperature areas, shall be of types required by NEC.
- W. During installation, do not deform cable by improper bending, stretching, twisting, kinking, or pinching, nor do any other abusive handling. Any failure to observe these instructions will be detected and corrected during the demonstrations following completion of the installation. All cable runs shall contain S loops or other means to accommodate expansion or contraction as required. Cable bends will have a radius not less than the value recommended by the cable manufacturer. Cable connected to electronic equipment in the system shall be tagged to show its function and the location of its other end. All labels shall be of durable material and securely fastened to the cable.

3.5 CONNECTIONS

- A. Conductor Splices: Keep to minimum.
- B. Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
- C. Use splice and tap connectors compatible with conductor material.
- D. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Wire splices and taps shall be adequate to carry full current rating of wire.
- G. Splices and taps in wires up to #8 AWG shall be made with *Scotch-lok* or T&B PT Series or Ideal Wing Nut insulated electrical connectors. Wire nuts installed in wet location boxes shall be silicon gel-filled. For wires #8 AWG and larger, use copper solderless connectors covered with insulating molded body and then wrapped with electrical tape. Use twist-on wire connectors for connecting lighting fixtures and small motor leads up to #8 AWG wire.

- H. Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet or junction boxes. Junction boxes may be utilized where required. Wire connectors of insulating material or solderless pressure connections, properly taped, shall be utilized for all splices in wiring.
- I. Splices in branch circuits and feeders shall be made where indicated or as required for the installation. All splices shall be accessible and made in enclosure approved for that purpose.
- J. For splices in branch circuits and feeders, provide connectors as follows;
 - 1. Wire Sizes 14 AWG to 10 AWG: Provide Ideal Model 74B or 76B or equivalent by T&B.
 - 2. Wire Sizes 8 AWG and Larger: Provide insulated connectors securely fastened to enclosure as specified in Part 2 of this section.
- K. Thoroughly clean wiring prior to installing lugs or connectors.

3.6 IDENTIFICATION

- A. Interface with Other Work:
 - 1. Identify wire and cable using Thomas and Betts Type WM vinyl markers.
 - 2. Identify each phase and neutral conductor with its circuit number or other designation indicated on the Drawings in all junction, pull, terminal boxes, and cabinets.
- B. Provide identification tags on each conductor entering each panelboard, switch, junction box, and pull box to identify conductor.
- C. Comply with the requirements of Division 26 Section, *Electrical Identification*.
- D. Feeder Identification: Securely fasten nonferrous identifying tags or pressure-sensitive labels to all cables, feeders, and power circuits in pull boxes, handholes, panelboards, and at termination of cables.
 - 1. Tags or labels shall be stamped or printed to correspond with markings on Contract Drawings or marked so that feeder or cable may be readily identified.
 - 2. If suspended type tags are provided, they shall be attached by approximately 55-pound test monofilament line or slip-free plastic cable lacing units.

3.7 FIELD QUALITY CONTROL

- A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.2. Certify compliance with test parameters.

- B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.
- E. Tests: All wire and cable and branch circuit insulation shall be tested after installation, and before connection to fixtures and appliance.
 - 1. Tests shall be performed with a 1,000-volt megger, and conductors shall test free from short-circuits and grounds.
 - 2. Conductors shall be tested phase-to-phase and phase-to-ground.
 - 3. Furnish the instruments, materials, and labor required. Perform the tests in the presence of the Owner's Representative.
 - 4. Actual test readings shall be recorded.
 - 5. Submit all test reports to the Architect for approval.
- F. Demonstration: Subsequent to wire and cable hook-ups, energize circuit and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

END OF SECTION

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GROUNDING AND BONDING
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CANNOT BE USED FOR BIDDING.

SECTION 26 05 26- GROUNDING AND BONDING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Division 26 Section "Conductors and Cables" for conductor and cable requirements.

1.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment and basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70 - National Electrical Code.
- B. Comply with UL 467 - UL Standard for Safety Grounding and Bonding Equipment.
- C. Comply with ANSI/IEEE C2 - National Electrical Safety Code.
- D. Comply with ANSI/IEEE 32 - Requirements, terms and test procedures for neutral grounding devices.
- E. Comply with IEEE Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- F. Comply with ANSI C33.8.
- G. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The Terms *Listed* and *Labeled*: As defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A *Nationally Recognized Testing Laboratory* (NRTL) as defined in OSHA Regulation 1910.7.

1.5 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of grounding electrodes and all primary grounding locations (i.e., water piping connection, building steel, etc.)

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Erico Inc.; Electrical Products Group.
 2. Heary Brothers Lightning Protection Co.
 3. Ideal Industries, Inc.
 4. ILSCO.
 5. O-Z/Gedney Co.
 6. Raco, Inc.
 7. Thomas & Betts, Electrical.

2.2 GROUNDING AND BONDING PRODUCTS

- A. Governing Requirements: Where types, sizes, ratings, and quantities indicated are in excess of National Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

2.3 WIRE AND CABLE GROUNDING CONDUCTORS

- A. Comply with Division 26, Section "Conductors and Cables". Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
- B. Equipment Grounding Conductors: Size as indicated on the Drawings, or as required by 2008 National Electrical Code (NEC) Table 250-122, whichever is larger. Insulated with green color insulation.
- C. Grounding Electrode Conductors: Size as indicated on the Drawings, in the Specifications, or as required by 2008 National Electrical Code (NEC) Table 250-66, whichever is larger. Insulated with green color insulation, unless installed in direct contact with earth, in which case conductors shall be bare.
- D. Bare Copper Conductors: Conform to the following:
1. Solid Conductors: ASTM B 3.
 2. Assembly of Stranded Conductors: ASTM B 8.

3. Tinned Conductors: ASTM B 33.

2.4 MISCELLANEOUS CONDUCTORS

- A. Braided Bonding Jumpers: Copper tape, braided bare copper wire, terminated with copper ferrules.
- B. Bonding Straps: Soft copper, 0.05 inch (1 mm) thick and 2 inches (50 mm) wide, unless otherwise indicated.

2.5 CONNECTOR PRODUCTS

A. Mechanical Connectors

1. The mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper ally material. Bolts, nuts, washers and lockwashers shall be made of silicon bronze and supplied as a part of the connector body and shall be of the two-bolt type.
2. Split bolt connector types are NOT allowed.
3. The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

B. Compression Connectors

1. The compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99 percent by IACS Standards.
2. The connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.
3. The installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.
4. The connectors shall be clearly marked with the manufacturer, catalog number, conductor size and the required compression tool settings.
5. Each connector shall be factory filled with an oxide-inhibiting compound.

PART 3 EXECUTION

3.1 APPLICATION

- A. Equipment Grounding Conductors: Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.

1. Install Equipment Grounding Conductor (EGC) with circuit conductors for the items below in addition to those required by Code:
 - a. Feeder circuits.
 - b. Lighting branch circuits.
 - c. Receptacle branch circuits.
 - d. Single-phase motor or appliance branch circuits.
 - e. Flexible raceway runs.
 - f. Metal-clad cable (MC) runs.
- B. Separately Derived Systems: Where NEC requires grounding, ground according to NEC Article 250-26.

3.2 INSTALLATION

- A. General: Ground electrical systems and equipment according to NEC requirements, except where Drawings or Specifications exceed NEC requirements.
- B. Grounding Conductors: Route along the shortest and straightest paths possible, except as otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Grounding shall satisfy requirements of the applicable publications. All exposed noncurrent-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in nonmetallic raceways, and grounded conductors of the wiring system shall be grounded.
- D. The grounded conductor (neutral) of the wiring system shall be connected to the system grounding conductor at a single place in the system by removable bonding jumpers, sized according to the applicable provisions of the National Electrical Code. The grounded conductor (neutral) connection to the grounding conductor (ground) shall be located in the enclosure for the system's overcurrent protection or where otherwise indicated on the Drawings or Specifications.
- E. Ground buses and neutral buses in panelboards, and those provided in any equipment shall be isolated except where required to be connected as specified above for the service entrance and in transformer terminal compartments.
- F. Equipment grounding conductors shall be extended from the ground bus in the distribution equipment to the receptacle, fixture or device lugs where they are provided. When not provided, they shall be connected to equipment enclosures. The connections shall be arranged such that removal of receptacle, the equipment grounding conductors, or ground jumpers from ground busing, shall not affect the system ground.

- G. Ground bus shall be provided as indicated on the Drawings or as necessary to provide termination for equipment grounding conductor. Non-current carrying metal parts of electric equipment shall be effectively grounded by bonding to the bus.
- H. Raceways shall not be considered as a grounding conductor. Each power, lighting, or control raceway shall have a separate equipment grounding conductor installed. Receptacles shall have a separate grounding pole. All switchgear and bus duct shall be equipped with a grounding bus separate from the neutral bus.

3.3 CONNECTIONS

- A. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Equipment Grounding Conductor (EGC) Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- C. Non-Contact Metal Raceway Terminations: Where metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.
- D. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.
- E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

- F. Moisture Protection: Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.4 ADJUSTING AND CLEANING

- A. Restore surface features, including vegetation, at areas disturbed by work of this Section. Reestablish original grades, except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION

CANNOT BE USED FOR BIDDING.

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SECTION 26 05 28 - ELECTRICAL FIRESTOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Through-penetration firestopping in fire rated construction.
 - 2. Through-penetration smoke-stopping in smoke partitions.
- B. Related items: Raceway seals and manufactured electrical devices: Refer to Division 26 Section, "Raceways and Boxes".

1.3 REFERENCES

- A. Underwriters Laboratories
 - 1. UL Fire Resistance Directory
 - a. Through-penetration firestop devices (XHCR)
 - b. Fire resistance rating (BXUV)
 - c. Through-penetration firestop systems (XHEZ)
 - d. Fill, void, or cavity material (XHHW)
- B. American Society for Testing and Materials Standards: ASTM E 814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

1.4 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time-rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.

- E. System: Specific products and applications classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
- F. Sleeve: Metal fabrication or pipe section extended through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other Sections and may or may not be required.

1.5 SYSTEM DESCRIPTION

- A. Design Requirements
 - 1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption.
 - 2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption.

1.6 SUBMITTALS

- A. Submit in accordance with Division 01, unless otherwise indicated.
- B. Product Data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specification of construction and fabrication.
 - 2. Manufacturer's installation instructions.
- C. Shop Drawings. Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements:
 - 1. Details of each proposed assembly identifying intended products and applicable UL system number, or UL classified devices.
 - 2. Manufacturer or manufacturer's representative shall provide qualified engineering judgment and drawings relating to non-standard applications as needed.
- D. Quality control submittals: Statement of qualifications.
- E. Applicators' qualifications statement: List past projects indicating required experience.

1.7 QUALITY ASSURANCE

- A. Installer's qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this project, plus the following:

1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
 2. At least 2 years experience with systems.
 3. Successfully completed at least 5 comparable scale projects using this system.
- B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the construction.
- D. Manufacturer shall be a member of the International Firestop Council (IFC).

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping:
1. Deliver products in original unopened packaging with legible manufacturer's identification.
 2. Coordinate delivery with scheduled installation date, allow minimum storage at site.
- B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.9 PROJECT CONDITIONS

- A. Existing conditions:
1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
 2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.
- B. Environmental requirements:
1. Furnish adequate ventilation if using solvent.
 2. Furnish forced air ventilation during installation if required by manufacturer.
 3. Keep flammable materials away from sparks or flame.
 4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

1.10 GUARANTEE

- A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fall in joint adhesion, extrusion resistance, migration resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be two years from date of substantial completion unless otherwise noted.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Hilti.
 - 2. 3M
 - 3. Nelson.

2.2 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Systems of devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrate type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.
 - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.
 - 2. Acceptable manufacturers and products.
 - a. Those listed in the UL Fire Resistance directory for the UL System involved and as further defined in the "System and Applications Schedule" in Part 3 of this Section.
 - b. All firestopping products must be from a single manufacturer.

2.3 ACCESSORIES

- A. Fill, void or cavity materials: As classified under category XHHW in the UL Fire Resistance Directory.
- B. Forming materials: As classified under category XHKU in the UL Fire Resistance Directory.
- C. Sleeves: Minimum 24 MSG galvanized steel, 12-inch diameter or smaller steel pipe. Sleeve shall project ½-inch from each surface of the floor/wall. Size as recommended by firestop manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting, adhesion, or the required fire resistance.

3.3 INSTALLATION

- A. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer's instruction.
- B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.
- C. Protect materials from damage on surfaces subject to traffic.
- D. When large openings are created in walls or floors to permit installation of conduits, cable tray, or other items, close unused portions of opening with firestopping materials tested for the application.
- E. Install smoke stopping as specified for firestopping.
- F. Provide sleeves the full thickness of the assembly being penetrated and cut sleeves to a length of 1-inch more than the over-all thickness of the penetration, or as recommended by the firestop manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.5 ADJUSTING AND CLEANING

- A. Clean up spills of liquid components.

- B. Neatly cut and trim materials as required.
- C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

3.6 SYSTEMS AND APPLICATION SCHEDULES*

PENETRATING ITEM	CONCRETE	GYPSUM	WOOD FLOOR/CEILING
Metal Pipe	CAJ1001 CP25S/L, CP25N/S CAJ1006 CS-195+, FS-195+ CAJ1007 FS-195+, 1-inch& 2-inch Wide CAJ1009 2000, 2000+, 2003 CAJ1010 2000, 2000+, 2003 CAJ1012 2000, 2000+, 2003 CAJ1013 2000, 2000+, 2003 CAJ1014 2000, 2000+, 2003 CAJ1015 2000, 2000+, 2003 CAJ1017 FD 150 CAJ1021 FD 150 CAJ1027 MPS-2+ CAJ1044 CP 25WB+ CAJ1052 CP 25S/L, CP 25N/S CAJ1058 2000, 2000+, 2003 CAJ1060 2000, 2000+, 2003 CAJ1063 2000, 2000+, 2003 CAJ1066 CP 25N/S,CP 25S/L, CP 25WB+ CAJ1091 CP 25N/S,CP 25S/L, CP 25WB+ CAJ1092 CP 25WB+ CAJ1112 FS-195+ CAJ1160 CP 25S/L, CP 25N/S CAJ1175 CP 25WB+ CAJ1176 CP 25WB+ CAJ1188 2000+ CBJ1020 CS-195+, FS-195+ CBJ1021 CS-195+, MPS-2+ CBJ1031 2001 CBJ1032 2001 FA1002 CP 25WB+ VJ1010 CP 25WB+ WJ1023 2001	WL1001 CP 25 WL1002 FS-195+ WL1003 CP 25WB+,CP 25N/S WL1008 2000+ WL1009 2000+ WL1010 2000+ WL1016 CP 25WB+ WL1017 CP 25WB+,CP 25N/S WL1032 CP 25WB+,CP 25N/S WL1036 FD 150 WL1037 CS-195+,FS-195+ WL1067 CP 25N/S WL1073 CP 25WB+ WL1080 MPS-2+ WL1082 2000+	FC1002 CP 25 FC1003 2000,2000+,20003 FC1006 CP 25WB+
Non-Metallic	CAJ2001 FS-195+, 1-inch& 2-inch WIDE, PPD'S CAJ2002 FS-195+ CAJ2003 CS-195+, FS-195+ CAJ2005 FS-195+ CAJ2006 FS-195+ CAJ2013 FS-195+ CAJ2019 2000, 2000+, 2003 CAJ2027 FS-195+, CP 25N/S, CP 25S/L, CP 25WB+ CAJ2028 FS-195, MPS-2+ CAJ2029 FS-195+, PPD'S CAJ2030 CS-195+, FS-195+ CAJ2040 FS-195+, CP 25WB+ CAJ2044 FS-195+, CP 25N/S, CP 25S/L	WL2002 FS-195+, PPD'S WL2003 FS-195+ WL2004 FS-195+ WL2005 FS-195+ 4' WIDE WL2006 FS-195+ WL2013 FS-195+ WL2031 CS-195+, FS-195+ WL2032 CS-195+, FS-195+ WL2033 FS-195+ WL2073 FS-195+ 1-inch WIDE	FC2002 FS-195+, PPD'S FC2007 FS-195+, PPD'S FC2008 FS-195+ FC2009 FS-195+, PPD'S FC2024 FS-195+ FC2026 FS-195+ FC2028 FS-195+, 1' & 2-inch WIDE, PPD'S

**DELAWARE STATE POLICE TROOPS 1 & 6 -
RENOVATIONS**

**DA LLC NO. 012-014
STATE NO. MC4506000035**

PENETRATING ITEM	CONCRETE	GYPSUM	WOOD FLOOR/CEILING
	CP 25 WB+ CAJ2090 FS-195+ CAJ2177 FS-195+, PPD'S FA2001 FS-195+, PPD'S FS2002 CS-195+, FS-195+, MPS-2+, PPD'S FA2011 FS-195+ WJ2012 FS-195+ 1-inch WIDE		
Insulated Cable	CAJ3001 CP 25N/S, CP 25S/L CAJ3005 CS 195+, FS-195+ CAJ3007 2001 CAJ3009 2000, 2000+, 2003 CAJ3010 2000, 2000+, 2003 CAJ3011 2001 CAJ3014 FD 150 CAJ3015 FD 150 CAJ3021 MPS-2+ CAJ3029 2000, 2000+, 2003 CAJ3030 CP 25WB+ CAJ3031 CP 25N/S, CP 25S/L CAJ3041 2000, 2000+, 2003 CAJ3044 CS-195+, FS-195+ CAJ3058 FS-195+, MPS-2+ CAJ3071 CP 25N/S, CP 25S/L CAJ3074 CP 25N/S, CP 25S/L CAJ3075 2001 CAJ3080 CP 25WB+ CBJ3016 CS-195+, FS-195+ CBJ3017 CS-195+, MPS-2+ FA3001 CP 25WB+ FB3004 CS-195+, MPS-2+ WJ3015 2001 WJ3016 2001	WL3001 CP 25, MPS-2+ WL3008 2000+ WL3009 2000+ WL3015 CP 25WB+, CP 25N/S WL3022 2000+ WL3030 FS-195+ WL3031 MPS-2+ WL3032 CP 25WB+ WL3041 2000+ WL3051 CP 25N/S WL3056 CP25N/S WL3062 CP 25WB+	FC3001 CP 25S/L, CP 25N/S FC3002 2000+ FC3003 2000, 2000+, 20003 FC3007 CP 25WB+, MPS-2+ FC3008 FS-195+
Mixed Penetrating Items Combos	CAJ8001 CS-195+ FS-195+ CAJ8003 2000, 2000+, 20003 CAJ8004 2000, 2000+, 20003 CAJ8006 2001 CAJ8013 FS-195+, CP 25 CBJ8004 CS-195, FS-195+ CBJ8005 CS-195+, MPS-2+ CBJ8008 2001 FA8001 FS-195+, CP 25WB+	WL8002 CS-195+, FS-195+	

* Underwriter's Laboratories, Inc., Fire Resistance Directory.

END OF SECTION

**DIVISION 26
SECTION 26 05 29
HANGERS AND SUPPORTS
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CANNOT BE USED FOR BIDDING.

SECTION 26 05 29 – HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Requirements of the following Sections apply to this Section:
 - 1. Division 26 Section, “Common Work Results for Electrical” for general installation requirements.
 - 2. Division 26 Section, “Electrical Firestopping” for requirements for firestopping at sleeves through walls and floors that are fire barriers

1.2 SUMMARY

- A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.
- B. Provide equipment supports consisting of structural members, hangers, rods, racks, and incidental materials.
- C. Provide all labor, supervision, and fabrication. Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to properly distribute the load and impact over building areas. Provide all engineering and fabrication as required for installation of support system.
- D. Provide hangers, clamps, anchors, inserts, supports, supplementary steel framing, and hardware of the proper size and load capacity to support electrical equipment and raceways, whether indicated on the drawings or not.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with conditions of Contract and Division 01 Specification Sections.
- B. Product data for each type of product specified.

1.4 QUALITY ASSURANCE

- A. Electrical Component Standard: Components and installation shall comply with NFPA 70 *National Electrical Code*.
- B. Electrical components shall be listed and labeled by UL, ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party Certification follow-up services.

- C. Installation Standard: Installation shall meet or exceed the National Electrical Contractors Association (NECA) Standard of Installation.
- D. All Strut Support System components must be supplied by a single manufacturer.
- E. Standards:
 - 1. Work shall meet the requirements of the following standards:
 - a. Federal, State and Local Codes.
 - b. American Iron and Steel Institute (AISI) Specification for the Design of Cold-Formed Steel Structural Members - August 19, 1986 Edition, December 11, 1989 Addendum.
 - c. American Society for Testing and Materials (ASTM).
 - d. Underwriters Laboratories (UL).
 - e. National Electrical Code (NEC).

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All material is to be delivered to the work site in original factory packaging to avoid damage to the finish.
- B. Upon delivery to the work site, all components shall be protected from the elements by a shelter or other covering.

1.6 GUARANTEE

- A. Separate guarantees shall be issued from the erector and manufacturer, valid for a period of one year against any defects that may arise from the installation or manufacture of the Strut Support System components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Slotted Metal Angle and U-Channel Systems:
 - a. American Electric, Kindorf
 - b. Alstrut
 - c. Unistrut Diversified Products

- d. Power-Strut
- e. Thomas & Betts

2.2 COATINGS

- A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion-resistance using approved alternative treatment, finish, or inherent material characteristic. All products shall be hot-dip galvanized.

2.3 MANUFACTURED SUPPORTING DEVICES

- A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.
- B. Fasteners: Types, materials, and construction features, as follows.
 - 1. Expansion Anchors - Carbon steel wedge or sleeve type.
 - 2. Toggle Bolts - All steel springhead type.
 - 3. Power-Driven Threaded Studs - Heat-treated steel, designed specifically for the intended application.
- C. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.
- D. U-Channel Systems: Sixteen-gauge channels with 9/16-inch-diameter holes at a minimum of eight inches on center in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacturer.

2.4 ANCHOR METHODS

- A. Hollow Masonry: Toggle bolts or plastic conical type expansion anchors.
- B. Solid Masonry: Lead expansion anchors or preset inserts.
- C. Metal Surfaces: Machine screws, bolts, or welded studs.
- D. Wood Surfaces: Wood screws.
- E. Concrete Surfaces: Self-drilling anchors or power-driven studs (non-seismic zones).

PART 3 EXECUTION

3.1 EXAMINATION

- A. The installer shall inspect the work area prior to installation. If work area conditions are unsatisfactory, installation shall not proceed until satisfactory corrections are completed.

3.2 INSTALLATION

- A. Set Strut System components into final position true to line, level and plumb, in accordance with approved Shop Drawings.
- B. Anchor material firmly in place. Tighten all connections to their recommended torques.
- C. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
- D. Coordinate with the building structural system and with other electrical installation.
- E. Raceway Supports: Comply with the NEC and the following requirements:
 - 1. Conform to manufacturer's recommendations for selection and installation of supports.
 - 2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 pounds, provide additional strength until there is a minimum of 200 pounds safety allowance in the strength of each support.
 - 3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
 - 4. Support parallel runs of horizontal raceways together on trapeze-type hangers.
 - 5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
 - 6. Space supports for raceways in accordance with Table I of this Section. Space supports for raceway types not covered by the above in accordance with NEC.
 - 7. Support exposed and concealed raceway within one foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminations are not made with chase nipples or threadless box connectors.
 - 8. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminations.

- F. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting disconnects, light fixtures, and other devices.
- G. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to the raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.
- H. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including, but not limited to conduits, raceways, boxes, disconnect switches, and control components in accordance with the following:
1. Fasten by means of toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures.
 2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4-inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
 3. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.
 4. Concrete (Existing): Double-plated expander type anchors. Phillips, Hilti, or approved equivalent. Loads shall not exceed 1/4 of tested pullout (or shear) strength.
- I. General Supporting Installations:
1. Provide appropriate concrete anchors for hanger rods. Rods shall be screwed into or extended through frame construction (with washer and nut). Supports shall secure conduit in place, and shall prevent vibration, provide for expansion and contraction and shall make neat appearance. Strap hangers or chains are not permitted.
 2. Electrical raceways 1-1/2-inches and smaller shall be secured with 1-hole malleable iron straps or brackets to walls. Trapeze supports shall be used for groups or parallel raceways with raceways secured to trapeze with approved clamps. Individual runs of raceways 2-inches and larger shall be supported by Clevis type hangers.
 3. Provide all steel supports including roof curbs for all equipment provided under this Section.
 4. Electrical raceway supports to be spaced on the following maximum centers, unless otherwise required by the NEC:

- a. 3/4-inch to 1-inch conduit - 8 feet
 - b. 1-1/4-inch and larger conduit - 10 feet
5. Provide additional hangers or steel members to distribute the load among two or more structural members when required or directed.
 6. Drilling of new concrete slabs will not be permitted. Anchors and inserts shall be cast in the concrete slabs.
- J. Locations:
1. Anchor bolts, sleeves, inserts, hangers, and supports required for the electrical work shall be furnished and installed under Division 26.
 2. Coordinate with other trades the location of anchors, sleeves, inserts, and supports and insure that they are properly installed.
 3. Openings and sleeves shall be set true to line, level, plumb, and position and shall be set true to line, level, plumb, and position and shall be so maintained during construction. Where sleeves and openings are provided in poured concrete, inspect same during and after concrete is poured to insure proper position and correct any deviation.
- K. Hangers and Supports:
1. Provide hangers, angles, channels, and other supports required by field conditions to install items of electrical equipment. Design of supports and methods of fastening to building structure shall be acceptable to the Owner.
 2. Use of power-actuated fasteners and devices is permitted in the vertical surfaces of the building only with the following requirements.
 - a. For fastening conduits 1-1/2-inch and smaller and lighting fixtures 50 lbs or less.
 - b. Load capacity per manufacturers' recommendations.
 - c. Fasteners shall be located in the thickest part of the slab.
 - d. Devices shall comply with OSHA requirements.
 3. Use of lead shield expansion anchors is not permitted.
 4. No electrical items shall rest on, or depend for support on suspended ceiling media (tiles, lath, plaster, splines, etc.).
 5. In suspended ceilings, support conduits directly from structural slabs, decks (or framing members). Do not support conduits on ceiling suspension members.

6. Support surface or pendant lighting fixtures:
 - a. From an outlet box by means of an interposed metal strap, where weight is less than 5 lbs.
 - b. From an outlet box by means of a hickey or other direct threaded connection, where weight is from 5 to 50 lbs.
 - c. Directly from structural slab, deck or framing member, where weight exceeds 50 lbs.
7. In addition to the above, provide cushioned, swivel type hangers with appropriate outlet boxes for pendant fixtures in mechanical areas. Such hangers shall have a support rating at least twice that of the load supported.
8. Support recessed lighting fixtures directly from structural slab, deck, or framing members. Refer to Division 26 Section "Interior Lighting" for additional installation requirements.
9. Provide weight-distribution facilities, where required so as not to exceed the load bearing capabilities of floor or walls that bear the weight of, or support, electrical items.
10. For point-of-attachment weight of 100 lbs. or less, fasten items as follows:
 - a. On wood, use wood screws.
 - b. On concrete and solid masonry that is already in place, use self-drilling concrete anchors or expansion bolt and couplings.
 - c. On hollow construction, use toggle bolts.
 - d. On structural steel, use beam clamps.
11. For point-of-attachment weights from 100 lbs. to 300 lbs., provide supports as follows:
 - a. At cast-in-place concrete slabs, use concrete inserts in bottom of slab, with 8" slip-through steel rods set transverse to the reinforcing steel.
 - b. At concrete slab already in place, uses 16-inches x 8-inches x ½-inch steel plates at the top of the slab, with through-bolts welded in place. The plates shall be chased in and grouted flush, where no fill is to be applied.
12. For point-of-attachment weights over 300 lbs., provide supports as follows: At cast-in-place concrete slabs, uses 16-inch x 8-inch x ½-inch steel plate, with through bolts welded in place. Top of the plate shall be 1-1/2-inches below the top of the slab or on top of the slab where a fill slab is to be installed.

13. Hangers and supports shall be hot dipped galvanized, unless noted otherwise.
14. Equipment shall not be held in place by its own dead weight. Provide base anchor fasteners in each case.
15. Trapeze type hangers may be used where several conduits are to be installed at the same elevation. The spacing of such trapeze hangers shall be in accordance with the NEC for the smallest conduit in the run.
16. Vertical conduits shall be supported by heavy wrought iron clamps or collars anchored to construction at each floor.

L. Inserts:

1. Inserts for suspended items in poured concrete construction shall be malleable-iron concrete inserts, adjustable type with insert nut. Items manufactured by Barrett, Crawford, Elcen, or Grinnell shall be used where applicable.
2. Inserts for surface-mounted items shall be suitable for the composition of the slab, wall, or structure on which installation is to be made.

M. TABLE I: SPACING FOR RACEWAY SUPPORTS

TABLE 1: SPACING FOR RACEWAY SUPPORTS			
Raceway Size (Inches)	No. of Conductors in Run	Location	Spacing (Ft.)
HORIZONTAL RUNS			
1/2, 3/4	1 or 2	Flat ceiling or wall.	5
1/2, 3/4	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	7
1/2, 3/4	3 or more	Any location.	7
1/2 - 1	3 or more	Any location.	
1 & larger	1 or 2	Flat ceiling or wall.	6
1 & larger	1 or more	Where it is difficult to provide supports except at intervals fixed by the building construction.	10
1 & larger	3 or more	Any location.	10
Any	---	Concealed.	10

3.3 CLEANUP

- A. Upon completion of this Section of work, remove all protective wraps and debris. Repair any damage due to installation of this section of work.

3.4 PROTECTION

- A. During installation, protect this work from damage.
- B. Upon completion of this scope of work, it shall become the responsibility of the General Contractor to protect this work from damage during the remainder of construction on the project and until substantial completion.

END OF SECTION

CANNOT BE USED FOR BIDDING.

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SECTION 26 05 33
RACEWAYS AND BOXES
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SECTION 26 05 33 - RACEWAYS AND BOXES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

- 1. Raceways include the following:

- a. EMT.
 - b. FMC.
 - c. Wireways.

- 2. Boxes, enclosures, and cabinets include the following:

- a. Device boxes.
 - b. Outlet boxes.
 - c. Pull and junction boxes.
 - d. Cabinets and hinged-cover enclosures.

- 3. Miscellaneous Products include the following:

- a. Expansion/Deflection fittings.
 - b. Bushings.

- B. Related Sections include the following:

- 1. Division 26 Section "Electrical Firestopping" for requirements for firestopping at penetrations through walls and floors that are fire barriers.
 - 2. Division 26 Section "Hangers and Supports" for raceways and box supports.
 - 3. Division 26 Section "Wiring Devices" for devices installed in boxes.
 - 4. Division 26 Section, "Surface Metal Raceway" for surface raceways, fittings, and accessories.

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FMC: Flexible Metal Conduit.

1.4 SUBMITTALS

- A. Product Data: For raceways, wireways and fittings, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: Include layout drawings showing components and wiring for nonstandard boxes, enclosures, and cabinets.

1.5 QUALITY ASSURANCE

- A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100
 - 2. Listing and Labeling Agency Qualifications. A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NECA's "Standard of Installation" and NECA 101 "Recommended Practice for Installing Steel Conduits".
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.
- B. Verify routing and termination locations of conduits and boxes prior to rough-in.
- C. Conduit routing shown on Drawings is only approximate and diagrammatic. Route conduits as required for a complete conduit and wiring system.
- D. Coordinate installation of outlet boxes, mounting heights, orientation, and locations of outlets.
- E. Coordinate mounting heights and locations of outlet boxes thoroughly with approved casework shop drawings.

1.7 PROJECT RECORD DOCUMENTS:

- A. Accurately record routing of all concealed conduits. Record actual routing of all exposed conduits/larger than 1 inch. Indicate actual locations and mounting heights of outlet boxes, pull and junction boxes, branch circuits, arrangements, etc.

PART 2 PRODUCTS

2.1 MANUFACTURERS

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

1. Metal Conduit and Tubing:
 - a. Allied Tube & Conduit Corporation.
 - b. Anamet, Inc.; Anaconda Metal Hose.
 - c. AFC/Monogram Company.
 - d. Carol Cable Co., Inc.
 - e. Cole-Flex Corp.
 - f. Electri-Flex Co.
 - g. Flexcon, Inc.; Coleman Cable Systems, Inc.
 - h. Grinnell Co.; Allied Tube and Conduit Div.
 - i. Monogram Co.; AFC.
 - j. Spiraduct, Inc.
 - k. Triangle PWC, Inc.
 - l. Wheatland Tube Corporation
2. Conduit Bodies and Fittings:
 - a. American Electric; Construction Materials Group.
 - b. Crouse-Hinds; Div. of Cooper Industries.
 - c. Emerson Electric Co.; Appleton Electric Co.
 - d. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - e. Lamson & Sessions; Carlon Electrical Products.
 - f. O-Z/Gedney; Unit of General Signal.
 - g. Scott Fetzer Co.; Adalet-PLM.
 - h. Spring City Electrical Manufacturing Co.

- i. Thomas & Betts Corporation.
- 3. Metal Wireways:
 - a. Hoffman Engineering Co.
 - b. Keystone/Rees, Inc.
 - c. Square D Co.
- 4. Boxes, Enclosures, and Cabinets:
 - a. American Electric; FL Industries.
 - b. Butler Manufacturing Co.; Walker Division.
 - c. Crouse-Hinds; Div. of Cooper Industries.
 - d. Electric Panelboard Co., Inc.
 - e. Erickson Electrical Equipment Co.
 - f. Hoffman Engineering Co.; Federal-Hoffman, Inc.
 - g. Hubbell Inc.; Killark Electric Manufacturing Co.
 - h. Hubbell Inc.; Kaco, Inc.
 - i. Lamson & Sessions; Carlon Electrical Products.
 - j. O-Z/Gedney; Unit of General Signal.
 - k. Parker Electrical Manufacturing Co.
 - l. Robroy Industries, Inc.; Electrical Division.
 - m. Scott Fetzer Co.; Adalet-PLM.
 - n. Spring City Electrical Manufacturing Co.
 - o. Thomas & Betts Corp.
 - p. Woodhead Industries, Inc.; Daniel Woodhead Co.

2.2 METAL CONDUIT AND TUBING

- A. EMT and Fittings: Hot galvanized steel O.D. with an organic corrosion-resistant I.D. coating. Listed to UL Safety Standard 797 and manufactured in accordance with ANSI C80.3.

1. Fittings: Compression type, NEMA FB1.
 - B. FMC: Zinc-coated steel.
 - C. Fittings: NEMA FB 1; compatible with conduit/tubing materials.
- 2.3 METAL WIREWAYS
- A. Material: Sheet metal sized and shaped as indicated.
 - B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
 - C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
 - D. Wireway Covers: Screw-cover type.
 - E. Finish: Manufacturer's standard enamel finish.
- 2.4 OUTLET AND DEVICE BOXES
- A. Sheet Metal Boxes: NEMA OS 1, galvanized flat-rolled sheet steel.
 - B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box, deep type, with gasketed cover, and threaded hubs.
 - C. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including corrosion-resistant screws, mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps, and metal straps for supporting outlet boxes which are compatible with outlet boxes being used and fulfilling requirements of individual wiring situations.
- 2.5 PULL AND JUNCTION BOXES
- A. Small Sheet Metal Boxes: NEMA OS 1.
 - B. Sheet metal boxes over 12" in any dimension shall comply with the requirements of Article "Enclosures and Cabinets" of this Section.
 - C. Boxes for Outdoor and Wet Locations: Flat flanged, surface-mounted, UL listed as raintight, galvanized cast iron box and cover with neoprene gasket and stainless steel cover screws.
 - D. Boxes for Buried Flush Grade Locations: NEMA 250, Type 6, flat flanged, UL listed as watertight, galvanized cast iron, aluminum or PVC box.
 1. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.

2. Cover Legend: "Electric" or "Communications" as appropriate.

2.6 BOX EXTENSIONS

- A. Prohibited on new construction.
- B. Where more than one box is needed to flush out installation, provide a large (i.e., 6" x 6") box to flush out the existing box and nipple over to a new box.

2.7 ENCLOSURES AND CABINETS

- A. Hinged-Cover Enclosures: NEMA 250, Type 1 in dry locations, and Type 4 in wet or damp locations, with continuous hinge cover and flush latch.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

2.8 EXPANSION / DEFLECTION FITTINGS

- A. Provide an expansion/deflection fitting in each concealed or exposed electrical run crossing a building expansion joint. Fittings shall be complete with bronze end couplings, neoprene sleeves, tinned copper braid integral bonding jumper and stainless steel bands. Expansion/deflection fittings shall be suitable for the size and type of conduit run they connect. Bonding jumper shall comply with NEC and UL requirements.
- B. Expansion/deflection fitting shall accommodate the following movements without collapsing or fracturing the conduit and damaging the wires it contains:
 1. Axial expansion or contraction up to 3/4-inch.
 2. Angular misalignment of the axes of the conduits up to 30 degrees in all directions.
 3. Parallel misalignment of the axes of the conduits up to 3/4-inch in all directions.
- C. Expansion/Deflection fitting shall be OZ/Gedney Type "DX" or approved equal by Crouse Hinds (Type XD).

2.9 BUSHINGS

- A. Bushings for 1-inch conduit and smaller shall be self-extinguishing thermoplastic type - 150°C temperature rating.
- B. Bushings for 1-1/4" conduit and larger shall be malleable iron body with 150 degrees C insulating ring. Insulating material shall be locked in place and non-removable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 RACEWAY AND BOX REQUIREMENTS

- A. Conduit Application Schedule:

Application	Conduit Type	Remarks
Exposed dry interior locations.	EMT	
Equipment connections in dry interior locations.	FMC (e.g. Greenfield)	Short lengths only (maximum 6 feet).
Concealed in dry wall construction.	EMT, MC Cabling	
Concealed above suspended ceilings.	EMT, MC Cabling	
Concealed in masonry walls.	EMT	

1. Provide galvanized Electrical Metallic Tubing (EMT) for concealed work above suspended ceilings and within interior partitions and for exposed interior work.
2. Provide Flexible Metal Conduit (FMC), e.g. Greenfield, in short lengths (maximum 6 feet) for the connection of lighting fixtures, dry type transformers and any vibrating equipment in dry interior locations. The flexible connections to recessed fixtures and equipment shall be sufficient slack to permit removal of fixture.
3. Aluminum conduit is prohibited.

- B. Fittings:

1. All fittings to match conduit material and to be suitable for the purpose intended. Join conduit with fittings designed and approved for the purpose and make joints tight.
2. Fasten EMT conduit with "Concretight" or "Raintight" compression fittings made from galvanized steel or malleable iron. Fittings using set screw or indentations as a means of attachment or made from cast "white metal" are prohibited. All connectors shall have insulated throats.
3. Fasten Flexible Metallic Conduit (FMC) with Thomas & Betts (T&B) "Tite-Bite" insulated connectors, or equal.

- C. Box Locations:

1. Electrical boxes shall accommodate wire pulling, splices, taps, equipment connections and Code compliance.
2. Coordinate access doors as required to provide access to boxes in hard ceilings and similar inaccessible areas.
3. Provide cast box (with threaded hubs) in high traffic areas (surface installations), as specified by Owner.

D. Outlet Boxes:

1. Outlet boxes for concealed work shall be zinc-coated or cadmium-plated sheet steel boxes suitable for the service and type outlet. Boxes and conduit fittings for outdoor and exposed work shall be NEMA 4 cast-aluminum, cast steel or cast iron type with threaded hubs for conduit entrance. Boxes and conduit fittings for outdoor work shall have gasketed cover plates. Extra large boxes shall be provided in accordance with the National Electrical Code where necessary to prevent crowding of wire in the box. Plastic boxes and cast "white metal" boxes classified as NEMA 4 will not be acceptable.
2. Outlet boxes in unplastered brick or block walls shall be provided with deep square-cut device covers. They shall be set so that the brick or block can be cut and fitted closely to the cover opening and so that the standard wall plate will cover the joint between the brick or block and the box.
3. All outlet boxes used for supporting fixtures shall be furnished with malleable iron fixture studs of "no-boil" type secured by locknut. Provide support for boxes occurring in suspended ceilings. Outlets in ceilings directly on bottom of joists shall be supported independent of ceiling construction. Outlets in suspended ceilings shall not be supported from ceiling construction.
4. All boxes, whether outlet, junction, pull, or equipment, shall be furnished with appropriate covers.
5. No sectionalized boxes shall be used.
6. Back-to-back outlet boxes are not permitted. Separate boxes a minimum of 6" in standard walls and a minimum of 2 feet in acoustical walls.
7. Provide knockout closures for unused openings.
8. Provide blank coverplates for all unused boxes.
9. For multiple device installations, provide multi-gang boxes. Sectional boxes are not permitted. Provide barrier separation of different voltage conductors in the same box.
10. Thoroughly coordinate mounting heights of boxes with casework and backsplash heights.

11. Provide recessed outlet boxes in finished areas, supported from interior partition studs. Supports are to be stamped steel stud bridges for hollow stud walls and adjustable steel channel fasteners for flush ceiling outlet boxes.
12. Provide back supports for boxes in metal stud walls.

E. Junction and Pull Boxes:

1. Junction and pull boxes shall be furnished and installed as shown or where required to facilitate pulling of wires or cables. Such boxes shall be installed in accessible locations. All boxes for concealed work shall be constructed of 12 gauge USS galvanized sheet steel minimum, unless otherwise specified or indicated and provided with mounting brackets and flat screw covers secured in position by round head brass or stainless steel 300 grade machine screws. Boxes for exterior work shall be cast aluminum or galvanized cast iron type with threaded hubs unless otherwise directed. Gasketed cover plates shall be furnished for outdoor installation.
2. Wherever possible, locate pull and junction boxes above accessible ceilings in finished areas.
3. Pull or junction boxes shall be supported independently of conduit.

3.3 INSTALLATION OF RACEWAYS

- A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
- B. Furnish and install a separate and independent raceway system as shown on the Drawings for each of the various wiring systems including, but not limited to, the following:

Lighting
Power 120/208 volt

1. All raceway systems shall be completely wired as specified herein, shown on drawings and/or required for satisfactory operation of the various systems.
2. Raceways, generally, shall be concealed conduit as specified herein. Where wiring troughs are required or used to facilitate the wiring installation, they shall be equal to Square D Company's Square-Duct and fittings, with hinged cover arranged for total removal, all finished in baked enamel and all components U/L listed. The gutters shall be of ample size to accommodate conductors therein and as required by the NEC.
3. Support all conduit not embedded in concrete or masonry such that strain is not transmitted to outlet boxes and pull/junction boxes, etc. Supports to be sufficiently rigid to prevent distortion of conduits during wire pulling.

- C. Minimum Raceway Size: 3/4-inch trade size (DN21).

- D. Conceal conduit and EMT, unless otherwise indicated, within finished walls, and ceilings.
- E. Electrical Metallic Tubing (EMT) shall be used for the following unless otherwise indicated:
 - 1. Branch circuits for lighting, receptacles, and power concealed in:
 - a. Dry wall construction.
 - b. Suspended ceilings.
 - c. Masonry walls.
 - 2. Exposed in equipment room areas as needed to serve fixed equipment.
- F. Wiring above ceiling shall be plenum rated cable, where required by Code.
- G. Wiring installed concealed above hard ceilings and exposed in areas with no ceilings shall be installed in conduit.
- H. Conduit shall be run concealed wherever possible, within walls, ceilings, or floors, unless otherwise indicated or specified. Where exposed conduit runs are shown or required, they shall be run parallel to building construction and shall be suitably supported at required intervals.
- I. Conduit may be run exposed in Mechanical Equipment rooms, Electrical rooms, and where necessary in Storage rooms and unfinished areas. Where conduit is run exposed, it shall be run as close as possible to walls and ceilings and shall not interfere with equipment, ductwork and piping.
- J. Keep raceways at least 12 inches (300 mm) away from parallel runs of flues, steam or hot-water pipes and other hot surfaces above 77 degrees F. Install horizontal raceway runs above water and steam piping.
- K. Install raceways level and square and at proper elevations. Provide adequate headroom.
- L. Complete raceway installation before starting conductor installation.
- M. Support raceways as specified in Division 26 Section "Hangers and Supports". Arrange supports to prevent misalignment during wiring installation.
- N. Use capped bushings or "push-penny" plugs to prevent foreign matter from entering the conduit system during construction. Clean and plug or cap all conduits left empty for future use.
- O. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab. Conduit stub-ups and stub-downs shall be arranged in a neat and orderly manner and shall emerge at right angles to floors or ceilings.

- P. Make bends and offsets so the inside diameter is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- Q. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.
- R. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.
- S. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
- T. Run parallel or banked raceways together, on common supports where practical.
- U. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- V. Join raceways with fittings designed and approved for the purpose and make joints tight.
1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.
- W. Tighten set screws of threadless fittings with suitable tools.
- X. Install pull wires in empty raceways. Use 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.
- Y. Lubricants for pulling wires shall be approved for use with the types of wire and conduit installed.
- Z. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
- AA. Use conduit hubs or sealing lock nuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- BB. Install no more than equivalent of three 90° bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inches (50 mm) in size.
- CC. Die-cast fittings of pot metal will not be accepted.
- DD. Conduits shall be free of any burrs, foreign objects, and water prior to conduit installation.
- EE. Conduit placed against concrete or masonry above ground shall be fastened to the concrete or masonry with pipe straps or one screw clamp attached to the concrete by means of expansion screw anchors and screws. "Caddy Clip" type hangers or straps will be permitted only in non-exposed areas and restricted to 3/4" conduit.

- FF. Electrical Metallic Tubing (EMT) shall not be strapped or fastened to equipment subject to vibration or mounted on shock-absorbing bases.
- GG. Conduits run to and from cabinets shall be run neatly, in accurate manner and shall emerge from the floors and ceilings at right angles thereto.
- HH. Provide wall flanges and gasketing on conduits entering fan housings to minimize air leakage at points of penetration of housing.
- II. Conduit risers shall be rigidly supported on the building structure, using appropriate supports only.
- JJ. In equipment spaces, such as fan rooms, plenums, etc., conduits and outlets may be exposed, but shall avoid interference with ventilating ducts, piping, etc.
- KK. Exposed conduit installed on or adjacent to ventilating ducts shall be installed after the ducts are in place, and shall be run from ceiling or wall junction boxes in such manner as to retain accessibility to junction box covers and to permit future removal or replacement of ducts.
- LL. Conduits and other electrical items shall not be fastened to, or supported from ventilating ducts but shall be separately supported. The method of supporting and details of the supporting members shall be reviewed by the Owner's Representative. In no case shall screws penetrate the sheet metal of the ducts.
- MM. Exposed conduit run on surface shall be supported according to Code and within three feet of each outlet, junction box, or cabinet, by galvanized malleable conduit clamps and clamp backs. Suspended conduits shall be supported every five feet by conduit hangers and round rods, or where two or more conduits are run parallel, by trapeze hangers suitably braced to prevent swaying.
- NN. Screws for all exposed work shall be stainless steel, unless otherwise noted.
- OO. Zinc coated galvanized steel screws may be used for interior dry locations only.
- PP. No running threads shall be cut or used.

3.4 INSTALLATION OF BOXES

- A. Provide grounding connections for raceway, boxes, and components as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors.
- B. Provide junction boxes, pull boxes, cable support boxes, and wireways as required for proper installation of the electrical work. Covers shall be accessible. Small junction boxes shall be similar to outlet boxes.
- C. Pull boxes, cable support boxes, and large junction boxes for indoor use shall be made of Code gauge steel or no less than 12 gauge. Covers shall be held in place with zinc-coated

galvanized steel screws. Paint interior and exterior surfaces with rust-inhibitive paint. (Pull boxes and covers shall be hot-dipped galvanized.)

- D. Pull boxes shall be installed at all necessary points to prevent injury to the insulation or other damage that might result from pulling resistance or for other reasons necessary for proper installation. Pull box locations shall be approved by the Owner's representative prior to installation.
- E. Where boxes are used in connection with exposed conduit, plain covers attached to the box with a suitable number of countersunk flat head machine screws shall be used.
- F. Exposed pull boxes will not be permitted in finished spaces.
- G. Location of pull boxes shall be coordinated with piping, ductwork, and other equipment so as to permit sufficient clearance for maintenance and access.
- H. Pull boxes recessed in walls or partitions shall be provided with flanged type covers.
- I. Outlet boxes and covers shall be sheet steel knockout type, zinc-coated, or cadmium-plated and shall be of proper Code size for the number of wires of conduits passing through or terminating therein, but in no case shall any box be less than 4" square, or boxes at end of a run and containing a single device may be of the "handy box" type. Covers for flush outlets shall finish flush with plaster or other finished surface. Approved factory-made knockout seals shall be used in all boxes where knockouts are not intact. Boxes in concrete shall be a type which will allow the placing of conduit without displacing the reinforcing bars. Additional pull boxes shall be installed as required to facilitate pulling of wires.
- J. Outlet boxes for lighting fixtures shall be equipped with fixture supporting devices.
- K. Outlet boxes for switches shall be of the gang type.
- L. Each circuit in each pullbox shall be marked with a tag guide denoting panels to which they connect.
- M. Boxes shall be separated to prevent sound transmission. Back-to-back boxes shall not be used.
- N. Outlet boxes shall be provided with suitable plaster rings and covers or plates.
- O. Unused knockout holes shall remain closed and those opened by error shall be closed with snap-in blanks.
- P. Outlet boxes shall not be smaller than required by Code for the number and size of wires to be installed.
- Q. Outlet boxes installed in plenum ceilings shall be in accordance with applicable codes.
- R. Outlet boxes shall be installed true and plumb so that the covers or plates will be level and at uniform elevations for the types of outlets contained.

- S. Outlet boxes for toggle switches at doorways shall be located at the strike side of the door as finally hung.
- T. Outlet box locations as indicated shall be considered to be approximate only. Determine exact locations from architectural details or from field instructions and coordinate outlet box locations with the work of other trades.
- U. Install junction and pull boxes to be accessible.
- V. Locations of junction and pull boxes requiring access panels shall be reviewed by the Owner's Representative.

3.5 INSTALLATION OF TERMINATIONS

- A. Where raceways are terminated with lock nuts and bushings, align the raceway to enter squarely, and install the lock nuts with dished part against the box. Where terminations cannot be made secure with one lock nut, use two lock nuts, one inside and one outside of the box.
- B. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
- C. Open ends shall be capped with approved manufactured conduit seals as soon as installed and kept capped until ready to pull in conductors.
- D. Where conductors 10 AWG or larger enter a raceway, cabinet, pull box, and junction box, the conductors shall be protected by an insulated bushing providing a smoothly rounded surface.
- E. Double lock nuts shall be used at termination of rigid conduit in knock-out openings.
- F. Ends of conduits shall be equipped with insulating bushings for 1" and smaller, and insulated metallic bushings for 1-1/4" and larger. Ends of conduit shall be temporarily capped prior to installation and during construction to exclude foreign material.

3.6 FLEXIBLE CONNECTIONS

- A. Use maximum of six (6) feet (1830 mm) of UL listed Flexible Metal Conduit (FMC) for recessed and semi-recessed fluorescent lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors.
- B. Grounding conductors with green colored insulation shall be extended through all flexible connections including fixture "whips", and fastened to terminals within the first junction boxes on either side of the flexible length.
- C. Flexible connections shall be sized per the Contract Drawings, or as required in accordance with Code; the more stringent requirement shall apply.

3.7 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to Manufacturer and Installer that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
- B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- C. Steel conduit: Conduit that shows corrosion within the guarantee period shall be replaced.

3.8 CLEANING

- A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.
- B. After conduits and accessories have been installed, and concreting operations completed, conduit runs shall be satisfactorily cleared of obstructions and foreign matter. Defects which might damage cable upon installation shall be corrected. Where new conduits installed are connected to existing conduits, the entire run to the nearest box or other termination point shall be cleaned.

END OF SECTION

CANNOT BE USED FOR BIDDING.

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SURFACE METAL RACEWAY
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CANNOT BE USED FOR BIDDING.

SECTION 26 05 34 – SURFACE METAL RACEWAY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SCOPE

- A. This specification covers a surface metal raceway systems used for branch circuit wiring. The metal raceway systems shall consist of raceway, appropriate fittings and device boxes to complete installation per the Electrical Drawings.
- B. In finished spaces, where conduit cannot be concealed and/or routed through existing walls, surface metal raceway shall be used. This applies to devices and equipment under Division 23 (e.g. thermostats, humidistats, control wiring, etc...), Division 26 (e.g. receptacles, switches, branch circuit wiring, etc...), and Division 28 (e.g. security devices, fire alarm devices, cabling, etc...)

1.3 CLASSIFICATION AND USE

- A. Surface metal raceway is to be utilized in dry interior locations only as covered in Article 386 of the National Electrical Code, as adopted by the National Fire Protection Association and as approved by the American National Standards Institute. Surface metal raceway systems shall be listed by Underwriters Laboratories under File Nos. E4376 Guide RJBT and E41751 Guide RJPR.

1.4 SUBMITTALS

- A. As-Built Drawings: If variations from approved shop drawings occur during the installation of the systems, final As-Built Drawings shall be submitted for each floor that has been altered.
- B. Submittals shall include catalog cuts of mounting devices, material sections, accessories, internal area descriptions, and wiring capacity charts. Submit sample of finish colors for final selection and approval.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. The surface metal raceway system specified herein for branch circuit wiring shall be manufactured by The Wiremold Company, Hubbell, or Steel City. Systems of other manufacturers may be considered equal if, in the opinion, and the written approval of the Engineer, they meet all the performance standards specified herein.

2.2 MATERIALS

- A. The raceway and all system components must be UL Listed. They shall be manufactured of steel; zinc plated, galvanized and/or finished in ivory ScuffCoat™ (a polyester topcoat over ivory base) and shall be suitable for field repainting to match surroundings.

2.3 SINGLE-CHANNEL SURFACE METAL RACEWAY - POWER

- A. Description: The raceway shall be a one-piece design with a base and cover factory assembled. Nominal raceway dimensions shall be 3/4" wide by 21/32" deep, with an approximate cross-sectional area of 0.30 square inches. The raceway base and cover shall have an approximate thickness of 0.040". The raceway shall be available in five and ten foot lengths.
- B. Fittings: A full complement of fittings must be available including but not limited to mounting clips and straps, couplings, flat, internal and external elbows, cover clips, tees, entrance fittings, conduit connectors and bushings. The covers shall be painted with an enamel finish, ivory in color to match the raceway. They shall overlap the raceway to hide uneven cuts. All fittings shall be supplied with a base where applicable. A transition fitting shall be available to adapt to other raceways.
- C. Device Boxes:
 - 1. Device boxes shall be available for mounting standard devices and faceplates. A device box shall be available in single- and multiple-gang configurations, up to six-gang. Single-gang boxes shall allow for snap-on and fastener application. Minimum depth shall be 2-1/4".
 - 2. Provide extra deep boxes (nominal 4" depth) where required to accommodate large devices.
 - 3. Extension boxes shall be available to adapt to existing standard flush switch and receptacle boxes.
 - 4. Round fixture and extension boxes shall be available to mount fixtures and other devices with mounting centers of 1-15/32", 1-5/8", 1-23/32", 1-27/32", 2-3/4", 3-1/2" and 4-1/16" diameters. Round fixture and extension boxes shall be available in depths ranging from 0.47" to 1.00" and in diameters of 3.00", 4.75", 5.50" and 6.38".
 - 5. All device and fixture box covers shall be painted with an enamel finish, ivory in color to match the raceway cover.
- D. Basis of Design: Wiremold V700 Series raceway with 5700 Series device boxes.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Prior to and during installation, refer to system layout or approval drawings containing all elements of the system. Installer shall comply with detailed manufacturer's instruction sheets

which accompany system components as well as complete system instruction sheets, whichever is applicable.

- B. Mechanical Security: All raceway systems shall be mechanically continuous and connected to all electrical outlets, boxes, device mounting brackets, and cabinets, also in accordance with manufacturer's installation sheets.
- C. Electrical Security: All metal raceway shall be electrically continuous and bonded in accordance with the National Electric Code for proper grounding.
- D. Raceway Support: Raceway shall be securely supported at intervals not exceeding 10 feet or in accordance with manufacturer's installation sheets.
- E. Completeness: All raceway systems shall be installed complete, including insulating bushings and inserts, appropriate fittings, and mounting hardware. All unused raceway openings shall be closed. All fittings shall be furnished by the raceway manufacturer.
- F. Provide grounding per the National Electrical Code and Local Codes. Maintain grounding continuity between raceway components to provide a continuous grounding path.
- G. All surface metal raceways shall be installed parallel with and perpendicular to the structure. All exposed edges where field cut, shall be coated by the Contractor to prevent corrosion, and field-painted to match surface raceway finish.
- H. Field cut straight cover sections between specific device covers.
- I. Use flat-head screws to fasten channel to surfaces. Mount plumb and level. Channels shall be secured at least every four feet (1220mm) with two-hole straps.
- J. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
- K. Fastener Option: Use clips and straps suitable for the purpose.
- L. Raceway surfaces damaged during installation shall be touched up with raceway manufacturer's matching paint.
- M. Provide UL-approved expansion fittings, complete with grounding jumpers, where raceways cross building expansion joints.
- N. Allow a minimum of 6-inches (152 mm) clearance from heat sources.
- O. Surface raceways shall be visually seamless, without gaps between sections. Gaps exceeding the width of 1/16-inch (approximately the width of a Standard #1 small paper clip wire) shall be corrected to reduce width of gap.
- P. Cut ceiling tiles tight to surface raceway, within a 1/4-inch tolerance (approximately the width of a Standard #2 pencil). Ceiling tile not cut tight to raceway shall be replaced at Contractor's expense.

- Q. Provide manufacturer's touch-up paint. Paint all screws and scratches to match surface raceway.

3.2 REMODELING WORK

- A. Surface metal raceway shall only be utilized where devices and/or wiring cannot be concealed in existing walls, unless otherwise indicated on the Contract Documents.
 - 1. New devices installed in existing metal stud/GWB walls shall be cut in with conduit/wiring concealed within the wall.
 - 2. New devices installed in existing CMU walls may be installed in surface-mounted outlet boxes served by surface metal raceway or dual-channel as specified in this Section.
- B. Exposed wiring on existing walls in finished areas, such as offices, corridors, toilets, etc., shall be installed in surface metal raceways. The exposed raceways shall be run in corners, adjacent to door trims, and in other ways to be as inconspicuous as possible, even when requiring additional lengths.
- C. All exposed raceways shall be installed in a manner approved by the Architect and Engineer.
- D. The exposed runs shall not be across an open wall surface.
- E. Horizontal runs of raceways shall be kept to an absolute minimum. Exposed raceway shall be run vertically into ceiling space above and below.

END OF SECTION

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ELECTRICAL IDENTIFICATION
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CANNOT BE USED FOR BIDDING.

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.
- B. This section includes labeling of all terminations and related subsystems; including, but not limited to, nameplates, wire markers, labeling and identification of equipment and other products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Schedule of Nomenclature: An index of electrical equipment and system components used in identification signs and labels. Provide a schedule of nameplates.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with ANSI A13.1 and NFPA 70 for color-coding.
- D. Comply with applicable EIA/TIA Standards.
- E. Comply with OSHA Standards.

1.5 DEFINITIONS

- A. Emergency systems include, but are not limited to, generator circuits and systems, fire alarm systems, exit sign circuits, emergency lighting circuits, etc.

PART 2 PRODUCTS

2.1 WIRING DEVICE FACEPLATE LABELS

- A. Adhesive Labels:
 - 1. Thermal transfer printable, clear polyester material with glossy finish, 1/2" high, width as required. Printed lettering shall be 1/4" high black text.

2. Labels shall be backed with permanent acrylic adhesive and shall exhibit good adhesion to many metal and other types of surfaces, including textured surfaces and low surface energy plastics.
3. Labels shall be resistant to humidity, temperature and UV light.
4. Labels shall meet requirements of UL 969 *Labeling and Marking Standard* and shall be RoHS compliant.
5. Provide Brady B-432 Series, or approved equal by acceptable manufacturer.

2.2 NAMEPLATES AND SIGNS

- A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.45
- B. General Nameplate Requirements:
 1. Use colors prescribed by ANSI A13.1, NFPA 70 and as follows:
 - a. Normal Power System: White lettering on black background.
 2. Backed with adhesive material formulated for the type of surface, intended use and installed location.
- C. Nameplates for Dry, Interior Locations:
 1. Engraving stock, melamine 3-layer plastic laminate.
 2. Minimum 1/16-inch (1.6-mm) thick for signs up to 20 sq. inches (129 sq. cm)
 3. Minimum 1/8-inch (3.2-mm) thick for signs larger than 20 sq. inches.
- D. Refer to Contract Drawings for typical nameplate details.
- E. Refer to Paragraph "Equipment Identification Labels" under Part 3 of this Section for installation requirements.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General:
 1. All branch circuit panelboards must be identified with the same designation used on the Contract Documents.
 2. Before attaching labels, clean all surfaces with the label manufacturer's recommended cleaning agent.
 3. Install all labels firmly, as recommended by the label manufacturer.

4. Labels attached to receptacle and switch faceplates shall be installed plumb and neatly on all equipment.
 5. Install nameplates parallel to equipment lines.
 6. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to inside of recessed panelboards in finished locations.
 7. Embossed tape will not be permitted for any application.
 8. Labels: All labels shall be permanent and be machine-generated. **NO HANDWRITTEN OR NON-PERMANENT LABELS SHALL BE ALLOWED.**
 9. Label size shall be appropriate for the outlet faceplate layout design. All labels to be used shall be self-laminating, white/transparent vinyl and be wrapped around the cable. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminated over the full extent of the printed area of the label.
- B. Panelboard Circuit Directories:
1. Panelboards shall be equipped with equipment nameplates as specified in paragraph "Equipment Identifications Labels" in this Section.
 2. Panelboards shall have accurate typed circuit directories indicating exactly what each branch circuit serves.
 3. The Contractor shall provide up to date circuit directories in new panelboards, indicating all deletions and additions, and to note the date of all changes on the directory.
 4. The circuit directories shall reflect the actual room numbers and exact circuit designations. Directories indicating the reference room numbers on the contract drawings or in the panelboard schedule shall not be acceptable.
 5. If at anytime after occupancy the circuit directories are found to be incorrect due to negligence by the installer, then the Contractor shall trace out circuits, and correct the directories at no additional cost to the Owner.
- C. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- D. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.
- E. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.
- F. Self-Adhesive Identification Products: Clean surfaces before applying.

- G. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover. Install label on inside face of door or cover in finished spaces.
- H. Circuit Identification Labels on Boxes: Install labels externally.
1. Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
 2. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
- I. Apply identification to conductors as follows:
1. Conductors to be Extended in the Future: Indicate source and circuit numbers.
 2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
 3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.
- J. Apply warning, caution, and instruction signs as follows:
1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
- K. Equipment Identification Labels: Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise noted, labels/nameplates shall identify equipment designation(s), voltage rating, and source (including source locations). Labels for disconnect switches, motor starters, etc..., shall indicate the designation of the load served as the "equipment designation". In general, labels requiring one or two lines of text shall be 1-1/2 inches high. Labels requiring three lines of text shall be 2 inches high. The first line of text, which shall indicate equipment designation/load served, shall utilize 1/2 inch high lettering. Remaining lines of text, which shall indicate voltage ratings and source information shall utilize 1/4 inch high lettering. Refer to the Drawings for nameplate examples. Apply labels to each unit of the following categories of equipment:
1. Panelboards.
 2. Electrical Cabinets and Enclosures.

- L. Fire Alarm: Junction box covers shall be painted red, except in finished spaces where they shall be painted to match adjacent surfaces. Box covers shall have a type written label to read "Fire Alarm" in accordance with requirements of NFPA 72.
- M. Surfaces shall be cleaned and painted, if specified, before applying markings.
- N. Place markings so that they are visible from the floor.
- O. Protect finished identification to insure that markings are clear and legible when project is turned over to the Owner.

END OF SECTION

CANNOT BE USED FOR BIDDING.

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SECTION 26 24 16
PANELBOARDS
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CANNOT BE USED FOR BIDDING.

SECTION 26 24 16 - PANELBOARDS

PART 1. GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

- A. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V and less.
- B. Panelboards may be series fully rated for the AIC identified. Documentation must be provided to support series ratings with submittal package.
- C. Related Sections include the following:
 - 1. Division 26 Section "Common Work Results for Electrical" for general materials and installation methods.
 - 2. Division 26 Section "Electrical Identification" for labeling materials.

1.3. SUBMITTALS

- A. Product Data: For each type of panelboard, accessory item, and component specified.
- B. Shop Drawings: For panelboards. Include dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:
 - 1. Enclosure type with details for types other than NEMA 250, Type 1.
 - 2. Bus configuration and current ratings.
 - 3. Short-circuit current rating of panelboard.
 - 4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
 - 5. Wiring Diagrams: Details of schematic diagram including control wiring and differentiating between manufacturer-installed and field-installed wiring.
- C. Qualification Data: For firms and persons specified in *Quality Assurance* Article.
- D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- E. Maintenance Data: For panelboard components to include in the Operation and Maintenance Manuals specified in Division 01.

- F. Project Record Data: Record actual locations of products, indicated actual branch circuit arrangement.

1.4. QUALITY ASSURANCE

- A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The Terms *Listed* and *Labeled*: As defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A *Nationally Recognized Testing Laboratory* as defined in OSHA Regulation 1910.7.
- B. Comply with NFPA 70, *National Electrical Code*.
- C. Comply with NEMA AB1, *Molded Case Circuit Breakers*.
- D. Comply with NEMA PB1, *Panelboards*.
- E. Comply with NEMA PB1.1, *Instructions for Safe Installation, Operation & Maintenance of Panelboards Rated 600 Volts or Less*.

1.5. EXTRA MATERIALS

- A. Keys: 2 spares of each type for panelboard cabinet lock.

PART 2. PRODUCTS

2.1. MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, supply equipment from one of the following manufacturers; no other manufacturers are acceptable:
 - 1. Square D Company. (Basis of Design)
 - 2. Eaton Corp.; Cutler-Hammer Products.
 - 3. Siemens Energy & Automation Inc.

2.2. PANELBOARD FABRICATION

- A. Enclosures: Flush- or surface-mounted cabinets as indicated. NEMA PB1, Type 1, unless otherwise indicated to meet environmental conditions at installed location.
- B. Front: Secured to box with concealed trim clamps, unless otherwise indicated. Front for surface-mounted panelboards shall be same dimensions as box. Fronts for flush panelboards shall overlap box, unless otherwise indicated.
- C. Directory Frame: Clear plastic cardholder, mounted inside each panelboard door.

- D. Phase and Neutral Bus: Hard drawn copper of 98 percent conductivity.
- E. Phase and Neutral Lugs: Provide mechanical lugs to accommodate the conductors shown on the Contract Drawings.
- F. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors. Bonded to box. Hard drawn copper of 98 percent conductivity.
- G. Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the over-current protective device ampere ratings indicated for future installation of devices.

2.3. LIGHTING AND APPLIANCE PANELBOARDS

A. Interior

- 1. Minimum short circuit current ratings as shown on the Contract Drawings, but not less than 10,000 AIC rms symmetrical amperes for 120/208V panelboards. Basis for design is Square D NQ (120/208V).
- 2. Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat rise tests conducted in accordance with UL 67. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and -G.
- 3. All current carrying parts shall be insulated from ground and phase to phase by high dielectric strength thermoplastic.
- 4. Interior trim shall be of dead front construction to shield user from energized parts. Dead front trim shall have preformed twist-outs covering unused mounting space.
- 5. Interiors shall be field convertible for top or bottom incoming feed.
- 6. Main circuit breakers in 100A interiors shall be horizontally mounted. Main circuit breakers over 100A shall be vertically mounted.
- 7. Interior leveling provisions shall be provided for flush mounted applications.
- 8. Main lug interiors up to 400 amperes shall be field convertible to main breaker.

B. Main Circuit Breakers

- 1. Main circuit breakers shall have an over-center, trip free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to

operate in a 40 degrees C ambient environment. Thermal elements shall be ambient compensating above 40 degrees C.

2. Two and three pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker that allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push to trip button for maintenance and testing purposes.
3. Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL listed for reverse connection without restrictive line or load markings.

C. Branch Circuit Breakers

1. Molded case branch circuit breakers shall have bolt-on type bus connectors.
2. Circuit breakers shall have an over-center toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two and three pole circuit breakers shall have common tripping of all poles.
3. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF. In addition, there shall be a red VISI TRIP indicator appearing in the clear window of the circuit breaker housing.

D. Enclosures

1. Type 1 Boxes
 - a). Boxes shall be galvanized steel constructed in accordance with UL 50 requirements. Galvannealed steel will not be acceptable.
 - b). Boxes shall have removable end-walls with knockouts located on one end. Boxes shall have welded interior mounting studs.
2. Type 1 Fronts
 - a). Fronts shall meet strength and rigidity requirements per UL 50 standards. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 - b). Panelboards shall have hinged front cover with entire front trim hinged to box with standard door within hinged front cover.
 - c). Front shall not be removable with the door locked.
 - d). Doors on front shall have rounded corners and edges shall be free of burrs.

PART 3. EXECUTION

3.1. INSTALLATION

- A. Install panelboards and accessory items according to NEMA PB 1.1.
- B. Mounting: Plumb and rigid without distortion of box. Mount flush panelboards uniformly flush with wall finish.
- C. Install filler plates in unused spaces.
- D. Wiring in Panelboard Gutters: Arrange conductors into groups, and bundle and wrap with wire ties after completing load balancing.
- E. Two or three pole circuit breakers shall be common trip type. Single pole breakers with handle ties will not be permitted.
- F. Tandem circuit breakers will not be permitted.
- G. Provide ground buses in panelboards as indicated on the Drawings. Ground bus shall be similar in all respects to neutral bus.
- H. Ground Fault Protection: Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289, *Application Guide for Ground Fault Circuit Interrupters*.
- I. Branch circuit breakers (or switches) serving clocks, telephone and communications equipment, refrigerators, exit signs, fire alarm system controls, etc., shall be equipped with lock clips to prevent accidental operation.
- J. Height: Six-feet, six-inches to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above the floor. Top breaker maximum height not to exceed 6 feet 8 inches.

3.2. IDENTIFICATION

- A. Identify field-installed wiring and components and provide warning signs as specified in Division 26 Section "Electrical Identification".
- B. Panelboard Nameplates: Label each panelboard with engraved laminated-plastic or metal nameplates mounted with corrosion-resistant screws. Refer to Division 26 Section "Electrical Identification" for nameplate requirements.
- C. Panelboard Circuit Directories: Provide a typewritten directory, indicating plainly what each branch circuit of the panelboard serves and where. Provide additional information as required by NEC. Spaces and spare breakers shall be written in pencil. Copying of Contract Drawing Panel Schedules and Descriptions shall not be acceptable. Circuit directory shall reflect final circuit connections, loads and locations after balancing of panelboard loads.

3.3. GROUNDING

- A. Make equipment grounding connections for panelboards as indicated.
- B. Provide ground continuity to main electrical ground bus as indicated.

3.4. CONNECTIONS

- A. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Neutral and ground conductors shall be isolated and terminated only at their respective bus bars. There shall only be one neutral-ground connection in service-entrance equipment by means of a removable main bonding jumper. Neutral and ground terminations at one bus bar shall not be acceptable.

3.5. FIELD QUALITY CONTROL

- A. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers for all devices rated 100-amperes or larger. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units, and retest.
 - 3. Reports: Prepare written reports of tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include records of repairs and adjustments made.
 - 4. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating results of tests and inspections, responsible organization and person, and date.
- B. Visual and Mechanical Inspection: Include the following inspections and related work:
 - 1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date drawings and panelboard schedules.
 - 2. Exercise and perform operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
 - 3. Check panelboard mounting, area clearances, and alignment and fit of components.
 - 4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.

5. Perform visual and mechanical inspection and related work for over-current protective devices.
 6. Verify that neutral-ground bonds do not exist at locations that are not service entrances or separately derived power sources.
- C. Electrical Tests: Include the following items performed in accordance with manufacturer's instructions:
1. Insulation resistance test of buses and portions of control wiring that is disconnected from solid-state devices. Insulation resistance less than 100 megohms is not acceptable.
- D. Retest: Correct deficiencies identified by tests and observations and provide retesting of panelboards. Verify by the system tests that the total assembly meets specified requirements.

3.6. CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

END OF SECTION

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WIRING DEVICES
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CANNOT BE USED FOR BIDDING.

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Straight-blade receptacles and associated device plates.
 - 2. GFCI receptacles.
 - 3. Toggle switches.
 - 4. Wall-box occupancy sensor switches.

1.3 DEFINITIONS

- A. GFCI: Ground-Fault Circuit Interrupter.

1.4 SUBMITTALS

- A. Product Data: For each product specified, indicating configurations, finishes, dimensions, and manufacturer's instructions.
- B. Shop Drawings: Legends for receptacles and switch plates.
- C. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 01.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NFPA 70.
- C. Comply with NECA Standard of Installation.
- D. Codes: Provide wiring devices conforming to the following:
 - 1. American National Standards Institute (ANSI): Provide lugs and receptacle devices constructed in accordance with ANSI C73, *Attachment Plugs and Receptacles, Dimensions of*.

2. Institute of Electrical and Electronics Engineers (IEEE): Construct and install wiring devices in accordance with requirements of IEEE 241, *Recommended Practice for Electric Power Systems in Commercial Building*.
3. National Electrical Manufacturers Association (NEMA): Provide wiring devices constructed and configured in accordance with the requirements of
 - a. WD1: General Requirements for Wiring Devices
 - b. WD5: Special Purpose Wiring Devices
 - c. WD6: Wiring Devices - Dimensional Requirements.
4. National Fire protection Association (NFPA): Comply with NFPA 70, *National Electrical Code*, as applicable to construction and installation of electrical wiring devices.
5. Underwriters Laboratories, Inc. (UL): Provide wiring devices which are UL listed and comply with the requirements of:
 - a. 20: General-Use Snap Switches
 - b. 514A: Metallic Outlet Boxes.
 - c. 514B: Fittings for Conduit and Outlet Boxes.
 - d. 943: Ground Fault Circuit Interrupters
- E. Occupancy sensors components supplied shall be from a manufacturer that has been continuously involved in the manufacturing of occupancy sensors for a minimum of five (5) years.
- F. All occupancy sensor components shall be UL listed, offer a five (5) year warranty and meet all state and local applicable code requirements.
- G. All occupancy sensor components shall comply with NEMA WD 7-2011, "Occupancy Motion Sensors Standard". Components that have not been tested in compliance with NEMA WD 7-2011 shall not be acceptable.

1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

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

1. Wiring Devices:
 - a. Hubbell, Inc.; Wiring Devices Div.
 - b. Pass & Seymour/Legrand; Wiring Devices Div.
 - c. Leviton Manufacturing Co., Inc.
 - d. Cooper Wiring Devices
2. Occupancy Sensors:
 - a. Cooper
 - b. Hubbell
 - c. Leviton
 - d. Sensor Switch
 - e. Watt Stopper

2.2 STRAIGHT BLADE RECEPTACLES

A. General Requirements

1. Straight blade receptacles shall have the following basic features:
 - a. One-piece brass mounting strap with integral ground for low resistance of fault currents.
 - b. Auto-ground clip to assure positive ground.
 - c. Impact-resistant nylon face and thermoplastic base housing.
 - d. #10 large head brass terminal and ground screws.

B. Duplex Convenience Receptacles

1. Duplex convenience receptacles shall be extra heavy-duty, specification grade, 20A, 125V.
2. Comply with NEMA WD-1, NEMA WD-6 configuration 5-20R, UL 498 and Federal Specification W-C-596.
3. Hubbell HBL5362 and Pass & Seymour 5362A, or approved equal by listed manufacturer.

2.3 GFCI RECEPTACLES

A. General Requirements

1. GFCI receptacles shall have the following basic features:
 - a. Solid-state ground-fault sensing and signaling.
 - b. Trip time of 0.025 seconds (nominal).
 - c. Trip threshold of +/- 5mA.
 - d. Indicator light that is lighted when device is tripped.
 - e. Auto-ground clip to assure positive ground.

- f. Impact-resistant nylon face and thermoplastic base housing.
- g. #10 large head brass terminal and ground screws.

B. Duplex GFCI Receptacles

- 1. Duplex GFCI receptacles shall be extra heavy-duty, specification grade, 20A, 125V.
- 2. Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, UL 498 and Federal Specification W-C-596.
- 3. Hubbell GF20, Pass & Seymour 2095, or approved equal by listed manufacturer.

2.4 SWITCHES

A. General Requirements

- 1. Switches shall have the following basic features:
 - a. Heavy-gauge one-piece copper alloy contact arm.
 - b. Fast "make" and positive "break" to minimize arcing.
 - c. Heavy-duty bumper pads for quiet operation.
 - d. High strength thermoplastic polycarbonate toggle.
 - e. Oversized silvery alloy contacts for long life and heat dissipation.
 - f. Nickel-plated steel strap with integral ground.
 - g. Auto-ground clip to assure positive ground.

B. Toggle Switches

- 1. Toggle switches shall be quiet-type, extra heavy-duty, horsepower-rated, industrial grade, 120/277V, 20A: Comply with NEMA WD 1, UL 20 and Federal Specification W-S-896.
- 2. Hubbell HBL1221 (single-pole), Pass & Seymour PS20AC1 (single-pole), or listed equal by acceptable manufacturer.

2.5 WALL-BOX OCCUPANCY SENSOR SWITCHES

A. Product numbers for Watt Stopper are as follows:

- 1. Wall Switch Sensors:
 - a. Single Relay: DSW 100 (ivory).

B. Wall switch sensors shall be capable of detection of motion at desk-top level up to 300 square feet, and gross motion up to 1,000 square feet.

C. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180-degree coverage capability.

- D. Sensors shall be dual-technology type using a combination of passive-infrared and ultrasonic detection method to distinguish between occupied and unoccupied conditions for area covered.
- E. Sensors shall feature built-in light level sensing for field-adjustable ambient light override.
- F. All sensors shall be capable of operating normally with any electronic ballast and PL lamp systems.
- G. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
- H. All sensors shall have readily accessible, user adjustable controls for time delay and sensitivity. Controls shall be recessed to limit tampering.
- I. Ultrasonic operating frequency shall be crystal controlled to within plus or minus 0.005 percent tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.
- J. All sensors shall provide a method of indication to verify that motion is being detected during testing and that the unit is working.
- K. All sensors shall have no leakage current to load, in manual or in Auto/Off Mode, for safety purposes and shall have voltage drop protection.
- L. All sensors shall have UL rated, 94 V-0 plastic enclosures.

2.6 FINISHES

- A. Wiring device catalog numbers in Section text do not designate device color. Device colors shall be as follows, unless otherwise indicated elsewhere in the Specifications and Drawings or as required by NFPA or device listing:
 - 1. Wiring Devices connected to Normal Power System: Finish selected by Architect.

2.7 DEVICE PLATES

- A. Device plates shall be provided for all switches and receptacles. Device plates shall be as manufactured to fit each type of single device, to fit devices which are ganged together, and they shall be same manufacturer as wiring devices with finish as follows:
 - 1. Material for Unfinished Spaces: Galvanized steel.
 - 2. Material for Finished Spaces: 0.04-inch-thick, Type 302, satin-finished stainless steel, except as otherwise indicated.
 - 3. Plate-Securing Screws: Metal with heads colored to match plate finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that outlet boxes are installed at proper height.
 - 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 - 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- C. By beginning Work, accepts conditions and assume responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner

3.2 INSTALLATION

- A. Install devices and assemblies plumb, level, and secure.
- B. Install wall plates when painting is complete.
- C. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top or as required by the local Authority Having Jurisdiction. Exception: Mount exterior GFCI weatherproof duplex receptacles horizontally with grounding terminals on the left, or as required by the local Authority Having Jurisdiction. Group adjacent switches under single, multi-gang wall plates.
- D. Protect devices and assemblies during painting.
- E. All 15 ampere and 20 ampere, 125 volt and 250 volt, non-locking type receptacles installed in damp or wet locations shall be listed weather-resistant type in accordance with 2011 NEC Article 406.9(A) and 406.9(B) and shall be installed within an enclosure that is weather proof when an attachment plug is inserted.
- F. All 15 ampere and 20 ampere, 125 volt, single-phase, non-locking type receptacles installed in the following locations shall have GFCI protection for personnel, in accordance with 2011 NEC Article 210.8(B).
 - 1. Bathrooms/Toilet Rooms
 - 2. Kitchens
 - 3. Within six (6) feet (1.8m) of sinks, plumbing fixtures and water piping.

- G. Where multiple receptacles are indicated on the Contract Drawings as GFCI type receptacles, each device must be a GFCI type receptacle. Protecting standard receptacles downstream from one GFCI receptacle is not acceptable.
- H. Switches shall be located as indicated on the drawings, arranged singular or in gangs within 18" of the door jam on the strike side of the door openings. Verify the door swings with the Architectural Drawings prior to rough-in.
- I. Switch and receptacle combinations shall be as above in a 2-gang box where both are of the same voltage. Provide separate boxes where different voltages are present.

3.3 IDENTIFICATION

- A. Comply with Division 26 Section "Electrical Identification".
 - 1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate. Light switches shall be labeled as to lights controlled and with circuit number and panel identification.
 - 2. Receptacles: All device plates shall be labeled to identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes. Labels shall be clear with black lettering. Protect label from damage during construction. Replace all damaged and unclear labels.
 - 3. Mark all conductors with the panel and circuit number serving the device at the device.
 - 4. Mark the panel and circuit number serving the device on the back side of the device plate with a permanent marking system, machine-generated, that does not show through the front of the plate.

3.4 CONNECTIONS

- A. Connect wiring device grounding terminal to outlet box with bonding jumper.
- B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.
- C. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- A. Test wiring devices for proper polarity, continuity, short circuits, and ground continuity. Operate each device at least six times.
- B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

- C. Replace damaged or defective components.

3.6 CLEANING

- A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

CANNOT BE USED FOR BIDDING.

**DIVISION 26
SECTION 26 51 00
INTERIOR LIGHTING
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SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes interior lighting fixtures, lamps, ballasts, emergency lighting units, and accessories.
- B. Provide a lighting fixture for each fixture shown on the Drawings as described in this Specification, of the design and quality indicated herein. Provide fixtures complete, including lamps of the wattage and type indicated.
- C. All materials, accessories, and any other equipment necessary for the complete and proper installation of all lighting fixtures included in this contract shall be furnished by the Contractor.
- D. Conformance: Fixtures shall be manufactured in strict accordance with the Contract Drawings and Specifications.
- E. Specifications and scale Drawings are intended to convey the salient features, function and character of the fixtures only and do not undertake to illustrate or set forth every item or detail necessary for the work.
- F. Minor details, not usually indicated on the Drawings nor specified, but that are necessary for the proper execution and completion of the fixtures, shall be included, the same as if they were herein specified or indicated on the Drawings.
- G. Omissions: The Owner shall not be held responsible for the omission or absence of any detail, construction feature, etc., which may be required in the production of the fixtures. The responsibility of accurately fabricating the fixtures to the fulfillment of this Specification rests with the Contractor.

1.3 SUBMITTALS

- A. Product Data: Submit fixture shop drawings in booklet form with separate sheet for each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:
 - 1. Dimensions of fixtures.
 - 2. Certified results of independent laboratory test for fixtures and lamps for electrical ratings and photometric data. Test data shall include manufacturer and model number for fixture being submitted.
 - 3. Emergency lighting unit battery and charger.

4. Fluorescent ballasts.
 5. Types of lamps.
- B. Product Certificates: Signed by manufacturers of lighting fixtures certifying that products comply with requirements.
 - C. Record Documents: Accurately record actual location of each luminaire with the associated switching/control arrangement.
 - D. Maintenance Data: For lighting fixtures to include in maintenance manuals specified in Division 01. Include technical data sheets and parts ordering information. Include testing and maintenance requirements and instructions for emergency lighting equipment.

1.4 QUALITY ASSURANCE

- A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction. Provide only UL listed and labeled fixtures with UL listed wiring. Wiring shall be suitable for the fixture temperature listing.
- B. Comply with NFPA 70.
- C. UL Listing: All fixtures shall be manufactured in strict accordance with the appropriate and current requirements of the Underwriters' Laboratories, Inc. (Standards for Safety), and others as they may be applicable. A UL listing shall be provided for each fixture type and the appropriate label or labels shall be affixed to each fixture in a position concealing it from normal view.
- D. Installer: All Installers shall have not less than five (5) years' experience in the installation of lighting fixtures of the type and quality shown.
- E. Materials, equipment and appurtenances, as well as workmanship provided under this Section, shall conform to the highest commercial standard as specified and as indicated on the drawings.
- F. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 220, 410, and 510 as applicable to installation, and construction of interior building lighting fixtures.
- G. NEMA Compliance: Comply with applicable requirements of NEMA Standards Publication Numbers LE1 and LE2 pertaining to lighting equipment and LE4 pertaining to recessed luminaires.
- H. IES Compliance: Comply with IES RP-1 pertaining to office lighting practices and RP-15, regarding selection of illuminance values for interior office building.
- I. UL Compliance: Comply with UL Standards, including UL 486A and B, pertaining to interior lighting fixtures. Provide interior lighting fixtures and components which are UL-listed and labeled.

- J. CBM Labels: Provide fluorescent lamp ballasts which comply with Certified Ballasts Manufacturer's Association Standards and carries the CBM label.
- K. NECA/IESNA Compliance: Comply with NECA/IESNA 500 – 1998 Standard, Installing Indoor Commercial Lighting Systems (ANSI).

1.5 COORDINATION

- A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction. Provide plaster frames, hangers, trim rings, and fittings, as required for each type of ceiling construction.
- B. The Contractor shall coordinate switch and lighting control devices with door swings and other architectural features.
- C. The Contractor shall be responsible for providing the required quantity of ballasts to provide the control and operations of the lighting fixtures as indicated by the lighting controls on the Drawings. For example, where two switches are indicated to serve fixtures, then two ballasts per fixture shall be provided.

1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty for Batteries: Written warranty, executed by manufacturer agreeing to replace rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Special Warranty Period for Batteries: Manufacturer's standard, but not less than 5 years from date of Substantial Completion.
- C. Special Warranties for Fluorescent Ballasts: Written warranty, executed by manufacturer agreeing to replace fluorescent ballasts that fail in materials or workmanship within specified warranty period.
 - 1. Special Warranty Period for Electronic Ballasts: Five years from date of manufacture, but not less than four years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, the products indicated in this Specification.
- B. Data listed and model number shown, in this Specification for each fixture type indicate minimum requirements and no exceptions will be made.

2.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- D. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
 - 1. Plastic for lenses and diffusers shall be formed of colorless 100% virgin acrylic as manufactured by Rhom & Haas, Dupont, or as acceptable. The quality of the raw material must equal or exceed IES, SPI and NEMA Specifications by at least 100%--which, as a minimum standard, shall not exceed a yellowness factor of 3 after 2,000 hours of exposure in the Fade-meter or as tested by an independent test laboratory. Acrylic plastic lenses and diffusers shall be properly cast, molded or extruded as specified, and shall remain free of any dimensional instability, discoloration, embrittlement, or loss of light transmittance for at least 15 years.
 - 2. Where optical lenses are used, they shall be free from spherical and chromatic aberrations and other imperfections which may hinder the functional performance of the lenses.
 - 3. Mechanical: All lenses, louvers, or other light diffusing elements shall be removable, but positively held so that hinging or other normal motion will not cause them to drop out.
 - 4. Cleaning: All lenses shall be turned over to the Owner clean and free of dust.

2.3 LAMP HOLDERS

- A. Fluorescent: Body - white urea plastic. Contacts: silver-plated phosphor bronze.

2.4 FINISHES

- A. Painted Surfaces: Synthetic enamel, with acrylic, alkyd, epoxy, polyester, or polyurethane base, light stabilized, baked on at 350 degree Fahrenheit minimum, catalytically or photo-chemically polymerized after application.
- B. Ceiling opening frames shall either be manufactured of non-ferrous metal, or be suitably rust-proofed after fabrication.
- C. Selection: Unless otherwise noted, finishes shall be as selected by the Architect.
- D. Undercoat: Except for stainless steel, give ferrous metal surfaces a five-stage phosphate treatment or other acceptable base bonding treatment before final painting and after fabrication.
- E. Unpainted non-reflecting surfaces shall be satin finished and coated with a stoved clear lacquer to preserve the surface. Where aluminum surfaces are treated with an anodic process, the clear lacquer coating may be omitted.
- F. Fixtures: Manufacturer's standard, unless otherwise indicated.
 - 1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
 - 2. Metallic Finish: Corrosion resistant.
- G. White finishes: Minimum of 85 percent reflectance.

2.5 FLUORESCENT LAMP BALLASTS

- A. Fluorescent Lamp Ballast Manufacturers: Provide quality ballasts by the Manufacturers listed below. Off-brand/generic ballasts shall NOT be acceptable.
 - 1. Advance
 - 2. Lutron.
 - 3. General Electric.
 - 4. Valmont.
 - 5. Universal
- B. General Requirements: Unless otherwise indicated, features include the following:
 - 1. Designed for type and quantity of lamps indicated at full light output.
 - 2. Conform to UL 935 *Fluorescent - Lamp Ballasts*.
 - 3. Total Harmonic Distortion Rating: Less than 10 percent.
 - 4. Sound Rating: A.

5. Conform to ANSI C82.1 Specifications for Fluorescent Lamp Ballast.
 6. Warranty: Minimum 2 years of warranty after the date of acceptance for all types of ballasts.
- C. Electronic Ballasts for Linear Lamps: Unless otherwise indicated, features include the following, besides those in "General Requirements" Paragraph above:
1. Certified Ballast Manufacturer Certification: Indicated by label.
 2. Lamp Starting Method: Programmed start.
 3. Nominal Ballast Factor: 87 percent, minimum, unless otherwise indicated.
 4. Power Factor: 90 percent, minimum.
 5. Encapsulation: Without voids in potting compound.
 6. Third Harmonic Content of Ballast Current: Less than 10 percent.
 7. Conform to IEEE C62.41, Category A.
 8. Conform to FCC Regulations, Part 15, Subpart J.
 9. Lamp Current Crest Factor shall be less than 1.7.
 10. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

2.6 EMERGENCY BATTERY PACKS:

- A. Unless otherwise indicated, features include the following:
1. Conform to UL 924 "Emergency Lighting and Power Equipment"
 2. Conform to NFPA 101 and International Building Code (IBC) requirements.
 3. Initial Light Output: Provide as indicated.
 4. Illumination time: 90 minutes, minimum.
 5. Battery: Long life, high temperature, maintenance-free Nickel-Cadmium battery with test switch.
 6. Self-Testing Diagnostics: Provide as indicated.
 7. Warranty: Minimum 5 year full product warranty.

2.7 LAMPS

- A. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3500K and 85 CRI, unless otherwise indicated.
- B. Noncompact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid-start circuits.
- C. Lamps shall conform to ANSI Standards C78 series and shall be as manufactured by General Electric, Philips, or Sylvania.

2.8 FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Common Work Results for Electrical" and Division 26 Section "Hangers and Supports", for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Recessed fixtures shall be removable from below to allow access to outlet/junction boxes in ceiling spaces.
- C. Each fixture shall be supplied with necessary straps, supports, or hangers, or other miscellaneous materials and devices to install them in a satisfactory manner to conform to architectural treatment and finishes in area in which they are to be installed. Consult all Mechanical, Architectural and Structural Plans and related Contract Documents to be familiar with all necessary details for proper fixture placement. Failure to do so will not relieve the Contractor of responsibility of furnishing all necessary material, complete to perform function intended for indicated lighting system.

2.9 FIXTURES

A. Fixture: Type "A"

1. Voltage: 120VAC.
2. Mounting: Recessed ceiling.
3. Nominal Dimensions: 24" x 24" x 3-11/16".
4. Lamps: (2) 31 Watt T8 U-shaped Fluorescent 6" legs.
5. Ballast Types and Features: One electronic ballast, with less than 10% total harmonic distortion. Ballast disconnecting means per 2011 NEC Article 410.130(G) shall be factory or contractor installed on each ballast.
6. Lens: #12 pattern acrylic, reverse apex, .125" minimum thickness.
7. External Finish: White painted parts finish with high-gloss baked enamel with five-stage iron-phosphate pretreatment.
8. Trim and Hardware: White powder painted door latches and flush white steel door frame. Die-formed heavy gauge T-hinges.
9. Manufacturers:

- a. Lithonia 2SP8 G Series
- b. Metalux 2GC8 Series
- c. Columbia ST8 Series

B. Fixture: Type "E"

1. Voltage: 120VAC.
2. Mounting: Wall Surface.
3. Nominal Dimensions: 13 1/4" x 5" x 3 5/8".
4. Lamps: (2) 5 Watt MR16 lamps.
5. Construction: White low-profile engineering grade thermoplastic housing shall be impact-resistant, scratch-resistant and corrosion proof. UL94V-0 rating, 6 volt 20 watts sealed lead calcium maintenance free battery.
6. Other Features: Self-diagnostics and damp location listing.
7. Manufacturers:
 - a. Dual Lite LZ20 I Series
 - b. Exitronix LL50H G2 Series

PART 3 EXECUTION

3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.
- B. Support for Fixtures independent of ceiling systems, ducts, and piping.
 1. Install a minimum of four support system rods or wires for each fixture from structure above. Locate not more than 6 inches (150 mm) from fixture corners.
 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
 3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
- C. Fixture installations with fixtures supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all lighting fixtures adequately, providing extra steel work for the support of fixtures if required. Any components

necessary for mounting fixtures shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.

- D. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions and approved shop drawings.
- E. Support for Recessed and Semi-Recessed Fixtures: Installed units may not be supported from suspended ceiling support system. Install ceiling system support rods or wires at a minimum of four rods or wires per fixture located not more than 6 inches from the fixture corners.
1. Fixtures Smaller Than Ceiling Grid: Install a minimum of four rods or wires for each fixture and locate at corner of the ceiling grid where the fixture is located. Do not support fixtures by ceiling acoustical panels.
 2. Fixtures of Sizes Less than Ceiling Grid: Center in the acoustical panel. Support fixtures independently with at least two 3/4-inch metal channels spanning and secured to the ceiling tees.
 3. Recessed fixtures shall be provided with the proper plaster frame or suitable adapter to receive the finished ceiling construction.
 4. Recessed lighting fixtures shall be suitable for the ceiling or wall material and construction in which they will be installed.
 5. All recessed incandescent lighting fixtures shall be provided with thermal protection per NEC requirements.
 6. Recessed mounted lighting fixtures shall be connected to a junction box with flexible conduit. Final connection to light fixture shall be with heat-resistant wire of the following type:
 - a. Recessed fluorescent 120 or 277 volt, No. 12 RHH or THHN.
 - b. Recessed incandescent 120 volt, No. 12 AF.
- F. Each lighting fixture shall be rigidly supported from the building construction and shall include suspension hangers, devices, and extra steel work for fixture support where required.
1. Support all lighting fixtures adequately. Special supports shall be installed as required.
 2. Luminaires shall be furnished with all necessary stems, plaster frames, hangers, for the safe support of the fixture. All supports for fixtures shall be adequate to support weight of the fixtures. All visible hanging devices and appurtenances shall have the same finish as the fixture unless specifically indicated otherwise.
- G. Coordinate with the work of other trades to determine modifications required to make fixtures suitable for ceilings as installed and verify the types of ceiling construction prior to fixture fabrication. Determine that the suspension method and the flange arrangement

for the fixtures coordinates with the ceiling type and its suspended system. Fixtures which are shipped to the project and do not fit, or which otherwise do not match the ceiling system, shall be returned for correction at no additional cost.

- H. Lamping: Lamp units according to manufacturer's instructions.
- I. Installation shall include receiving, checking, storage in a safe and approved area until they are required for installation, unpacking, assembly of separate fixture components where required, and complete wiring and connection including the provision of associated wiring and connection devices such as fittings, hangers, aligners, box covers, and similar hardware which may be required for certain fixtures, but are not detailed or scheduled with the fixtures.
- J. Trim rings shall be painted to match the finish of the adjacent ceiling surface.
- K. Fluorescent fixtures shall be shielded from the dimmed areas to eliminate bleed.
- L. Fixtures in equipment rooms shall be positioned clear of equipment interference and yet provide adequate light for working around the equipment.
- M. All lighting fixtures, when installed, shall be set free of light leaks, warps, dents, or other irregularities.
- N. In certain areas shown on the Drawings, the locations of fixtures are approximate only and the exact locations and pendant lengths will be determined for each individual fixture by the Owner's Representative.
- O. Install all lamps required, including replacements for burned out lamps, until final acceptance of the completed work. No lighting fixture or sign will be installed without lamps.
- P. If permanent lighting fixtures are to be used in lieu of temporary lighting facilities during the construction period, this shall be done only as permitted by the Owner's Representative, who may require that new lamps be installed and fixtures cleaned at the time of turnover to the Owner.
- Q. Lighting fixtures for general illumination, emergency lighting, and exterior lighting, shall be complete with all required accessories and attachments.
- R. Fixtures shall bear UL label and shall be wired and installed in full compliance with applicable codes.
- S. The omission of a type or quantity in this Specification or the fixture schedule shall not relieve the Contractor of the responsibility of installing all required fixtures, of proper type, as shown on the Drawings.
- T. Fixtures shall be recessed or surface type, as specified and shall include sockets, diffusers, ceiling canopies and stems, hickey's, and all other necessary accessories.

- U. Where suspended ceilings with steel channels occur, outlets and fixtures shall be supported on members resting on the channel framework. In no case shall fixtures be supported from plasterboard, plaster, or acoustic material.

3.2 GENERAL INSTALLATION OF FIXTURES

- A. Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's *Standard of Installation*, NEMA Standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.
- B. All recessed fixtures mounted in dry wall or plaster ceilings shall be complete with a suitable plaster frame or trim ring. All fixtures shall be mounted on or in ceilings in accordance with published recommendations of the manufacturers using bar or swing-way hangers, etc. These items shall be furnished as part of the fixture whether called for by catalog number or not.
- C. All fixtures shall be installed in strict accordance with NEC Article 410 and shall properly and suitably support the weight of any fixture installed. All fixtures shall be supported independently of ceiling suspension system being attached to building structure.
- D. Regardless of catalog number in lighting fixture schedule, every fixture shall be of the type for the ceiling construction in or on which it is to be installed. It shall be the Electrical Contractor's responsibility to coordinate this with the Ceiling Contractor.
- E. Install surface-mounted fixtures properly to eliminate light leakage between fixture frame and finished surface. Apply small bead of caulk or silicone around perimeter of fixture to conceal gaps between fixture and finished surface.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B, and the National Electrical Code.

3.3 CONNECTIONS

- A. Ground equipment. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Advance Notice: Give dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: As follows:

1. Verify normal operation of each fixture after installation.
 2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.
 3. Report results in writing.
- E. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
- F. Corrosive Fixtures: Replace during warranty period.

3.5 CLEANING AND ADJUSTING

- A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.
- B. Adjust aimable fixtures to provide required light intensities.
- C. Touch up luminaire finish at completion of work.
- D. Replace all lamps that fail within three (3) months of Substantial Completion.
- E. Replacement Lamps: At the time of Substantial Completion, replace lamps in interior lighting fixtures which are observed to be noticeably dimmed or burned out after Contractor's use and testing. Furnish stock or replacement lamps as specified in this Section, Paragraph "Extra Materials". Deliver replacement stock as directed. Refer to Division 01 Sections for the replacement/restoration of lamps in interior lighting fixtures, and where used, the temporary lighting prior to time of Substantial completion.

END OF SECTION

**DIVISION 28
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COMMON WORK RESULTS FOR ELECTRONIC SAFETY & SECURITY
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SECTION 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY & SECURITY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Electronic Safety & Security equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Foam Duct Sealant.
 - 4. Common Electronic Safety & Security installation requirements.
- B. Provide all labor, materials, equipment, and services necessary for and incidental to the complete installation and operation of all Electronic Safety & Security work.
 - C. Unless otherwise specified, all submissions shall be made to, and acceptances and approvals made by the Architect and the Engineer.
 - D. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange conduits, equipment, and other work generally as shown on the Contract Drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in accordance with Article "Submittals" specified below. The right is reserved to make reasonable changes in location of equipment, boxes, conduit/wiring, and devices, up to the time of rough-in or fabrication.
 - E. Conform to the requirements of all rules, regulations and codes of local, state and federal authorities having jurisdiction.
 - F. Coordinate the work under Division 28 with the work of all other construction trades.
 - G. Be responsible for all construction means, methods, techniques, procedures, and phasing sequences used in the work. Furnish all tools, equipment and materials necessary to properly perform the work in first class, substantial, and workmanlike manner, in accordance with the full intent and meaning of the Contract Documents.
 - H. Arrange conduit, wiring, equipment, and other work generally as shown, providing proper clearances and access. Carefully examine all Contract Drawings and fit the work in each location without substantial alteration. Where departures are proposed because of field conditions or other causes, prepare and submit detailed shop drawings for approval in accordance with Article "Submittals" as hereinafter specified. The right is reserved to make reasonable changes in location of equipment, conduit, wiring, and devices up to the time of rough-in or fabrication.

1.3 PERMITS AND FEES

- A. Obtain all permits and pay taxes, fees and other costs in connection with the work. File necessary plans, prepare documents, give proper notices and obtain necessary approvals. Deliver inspection and approval certificates to Owner prior to final acceptance of the work.
- B. Permits and fees shall comply with Division 01 Section, *General Requirements*.
- C. Notify Inspection Authorities to schedule inspections of work.
- D. Notify Architect and Engineer in advance of scheduled inspections.
- E. An electrical foreman, superintendent or other supervisor shall be in attendance for all scheduled inspections

1.4 EXAMINATION OF SITE

- A. Examine the site, determine all conditions and circumstances under which the work must be done, and make all necessary allowances for same. No additional cost to the Owner will be permitted for Contractor's failure to do so.
- B. Verify that utility services are available, of the correct characteristics, and in the correct locations.

1.5 INTERPRETATION OF DOCUMENTS

- A. Any discrepancies between Drawings, Specifications, Drawings and Specifications, or within Drawings and Specifications, shall be promptly brought to the attention of the Owner during the bidding period. No allowance shall subsequently be made by reason of failure to have brought said discrepancies to the attention of the Owner during the bidding period or of any error on the Bidder's part.
- B. The locations of products shown on Drawings are approximate. Place the devices to eliminate all interference with above-ceiling ducts, piping, etc. Where any doubt exists, the exact location shall be determined by the Owner.
- C. All general trades and existing conditions shall be checked before installing any devices, equipment, wiring, etc.
- D. Equipment sizes shown on the Drawings are estimated. Before installing any wire or conduit, obtain the exact equipment requirements and install wire, conduit, or other item of the correct size for the equipment actually installed. However, wire and conduit sizes shown on the Drawings shall be taken as a minimum and shall not be reduced without written approval from the Owner.
- E. Where variances occur between the Drawings and Specifications or within either document itself, the item or arrangement of better quality, greater quality, or higher cost shall be included in the Contract Price. The Engineer will decide on the item and manner in which the work shall be installed.

- F. Contract Drawings are generally diagrammatic and all offsets, fittings, transitions, and accessories are not necessarily shown. Furnish and install all such items as may be required to fit the work to the conditions encountered. Arrange conduits, equipment, and other work generally as shown on the Contract Drawings, providing proper clearance and access. Where departures are proposed because of field conditions or other causes, prepare and submit detailed Shop Drawings for approval in accordance with Article "Submittals" as herein after specified. The right is reserved to make reasonable changes in location of equipment, conduit/wiring, and devices, up to the time of rough-in or fabrication.
- G. Work not specifically outlined, but reasonably incidental to the completion of the work, shall be included without additional compensation from the Architect, Engineer, and Owner.
- H. Perform the work in a first-class, substantial and workmanlike manner. Any materials installed which do not present an orderly and neat workmanlike appearance shall be removed and replaced when so directed by the Engineer, at the Contractor's expense.
- I. The complete set of Architectural, Civil, Structural, Mechanical, and Electrical Drawings and Specifications apply to this work. The successful Bidder shall familiarize himself with all other related documents.

1.6 MATERIALS AND EQUIPMENT

- A. Materials and equipment installed as a permanent part of the project shall be new, unless otherwise indicated or specified, and of the specified type and quality.
- B. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish named item, or its equal, subject to approval by Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for available space, required arrangement, and application. Submit all data necessary to determine suitability of substituted items, for approval.
- C. The suitability of named item only has been verified. Where more than one item is named, only the first named item has been verified as suitable. Substituted items, including items other than first named shall be equal or better in quality and performance to that of specified items, and must be suitable for available space, required arrangement and application. Contractor, by providing other than the first named manufacturer, assumes responsibility for all necessary adjustments and modifications necessary for a satisfactory installation. Adjustments and modifications shall include but not be limited to electrical, structural, support, and architectural work.
- D. Substitution will not be permitted for specified items of material or equipment where noted.
- E. All items of equipment furnished shall have a service record of at least five (5) years.

1.7 FIRE SAFE MATERIALS

- A. Unless otherwise indicated, materials and equipment shall conform to UL, NFPA and ASTM standards for fire safety with smoke and fire hazard rating not exceeding flame spread of 25 and smoke developed of 50.

1.8 REFERENCED STANDARDS, CODES AND SPECIFICATIONS

A. Specifications, Codes and Standards listed below are included as part of this Specification, latest edition:

1. ADA - Americans with Disabilities Act
2. ANSI - American National Standards Institute
3. ASTM - American Society for Testing and Materials
4. CSA - Canadian Standards Association
5. DNREC - Delaware Department of Natural Resources and Environmental Control
6. EPA - Environmental Protection Agency
7. IBC - International Building Code
8. IEEE - Institute of Electrical and Electronics Engineers
9. NEC - National Electrical Code
10. NECA - National Electrical Contractors Association
11. NEMA - National Electrical Manufacturers Association
12. NFPA - National Fire Protection Association
13. OSHA - Occupational Safety and Health Act
14. UL - Underwriters' Laboratories

B. Electrical construction materials shall, where a listing is normal for the particular class of material, be listed in *Electrical Construction Materials List* of the Underwriters' Laboratories, Inc. (U.L.) and shall bear the listing label. Electrical equipment shall, where a listing is normal for the particular class of equipment, be listed in the *Electrical Appliance and Utilization Equipment List* of the Underwriters' Laboratories, Inc. (U.L.) and shall bear the listing label. Materials and equipment listed and labeled as "approved for the purpose" by other nationally recognized testing laboratory, inspection agency or approved organization (such as E.T.L. or Factory Mutual) shall be acceptable.

1.9 SUBMITTALS

A. Product Data: For items specified in Part 2 of this Section.

1.10 SUBMITTALS, REVIEW AND ACCEPTANCE

A. Equipment, materials, installation, workmanship and arrangement of work are subject to review and acceptance. No substitution will be permitted after acceptance of equipment or materials except where such substitution is considered by the Engineer, to be in best interest of Owner.

B. After acceptance of Material and Equipment List, submit six (6) copies, or more as required under the General Conditions, of complete descriptive data for all items. Data shall consist of specifications, data sheets, samples, capacity ratings, performance curves, operating characteristics, catalog cuts, dimensional drawings, wiring diagrams, installation instructions, and any other information necessary to indicate complete compliance with Contract Documents. Edit submittal data specifically for application to this project.

C. Thoroughly review and stamp all submittals to indicate compliance with contract requirements prior to submission. Coordinate installation requirements and any electrical requirements for equipment submitted. Contractor shall be responsible for correctness of all submittals.

- D. Submittals will be reviewed for general compliance with design concept in accordance with Contract Documents, but dimensions, quantities, or other details will not be verified.
- E. Identify submittals, indicating intended application, location and service of submitted items. Refer to specification sections or paragraphs and drawings where applicable. Clearly indicate exact type, model number, style, size and special features of proposed item. Submittals of a general nature will not be acceptable. For substituted items, clearly list on the first page of the submittal all differences between the specified item and the proposed item. The Contractor shall be responsible for corrective action and maintaining the specification requirements if differences have not been clearly indicated in the submittal.
- F. Submit actual operating conditions or characteristics for all equipment where required capacities are indicated. Factory order forms showing only required capacities will not be acceptable. Call attention, in writing, to deviation from contract requirements.
- G. Acceptance will not constitute waiver of contract requirements unless deviations are specifically indicated and clearly noted. Use only final or corrected submittals and data prior to fabrication and/or installation.
- H. For any submittal requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold Contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return of any reason.

1.11 SHOP DRAWINGS

- A. Prepare and submit Shop Drawings for all electrical equipment, specially fabricated items, modifications to standard items, specially designed systems where detailed design is not shown on the Contract Drawings, or where the proposed installation differs from that shown on Contract Drawings.
- B. Submit Product Data and Shop Drawings including but not limited to the list below, in addition to provisions of the paragraph above. Identify all shop drawings by the name of the item and system and the applicable Specification paragraph number and Drawing number.
- C. Every submittal including, but not limited to the list below, shall be forwarded with its own transmittal as a separate, distinct shop drawing. Grouping of items/systems that are not related shall be unacceptable.

Items and Systems

1. Access Doors
2. Fire Alarm System Components
 - a. Notification Devices (Pull Stations, Smoke Detectors, Heat Detectors, etc.)
 - b. Signaling Devices (Horns, Strobes, Speaker Strobes, etc.)
 - c. Wire and Cable
3. Firestopping Materials
4. Identification Products
5. Operation and Maintenance Manuals

6. Record Drawings
 7. Sleeves
 8. Tests and Reports
 9. Wiring Diagrams
- D. Submittals shall include, but not be limited to, the following information: size, type, functional characteristics, compliance with standards in Division 28, required service access which shall be suitable for intended location and use, electrical service connections and requirements, and deviations from Contract Document requirements.
- E. Submit for approval any other shop drawings as required by the Architect, Engineer, or Owner. No item listed above shall be delivered to the site, or installed, until approved. After the proposed materials have been approved, no substitution will be permitted except where approved by the Engineer.
- F. Submit for approval schematic diagrams of each electrical system installed in the building. Diagrams shall indicate device location, service, type, make, model number and the identification number of each device in the particular system. Following approval by all authorities, the diagrams shall be framed, mounted under glass and hung in each Main Equipment Room. Deliver the tracing or sepia from which the diagrams were reproduced to the Owner.
- G. Submittals shall include Riser Diagrams and Schematic Wiring Diagrams, complete conduit and wire requirements, outlet and junction box sizes and power requirements, for the following systems:
1. Fire Alarm System
- H. For any shop drawing requiring more than two (2) reviews by the Engineer (including those caused by a change in subcontractor or supplier) the Owner will withhold Contractor's funds by a change order to the contract to cover the cost of additional reviews. One review is counted for each action including rejection or return for any reason.
- I. Prepare and submit a detailed schedule of values indicating the Contract costs for the major work items. Provide additional detail and information as requested by the Engineer.

1.12 DEFINITIONS

- A. *Approve*: To permit use of material, equipment or methods conditional upon compliance with contract documents requirements.
- B. *Building Line*: Exterior wall of building.
- C. *Concealed*: Hidden from sight in chases, formed spaces, shafts, hung ceilings, embedded in construction.
- D. *Conduits* include conduit, all fittings, identification, and other accessories relative to such conduit.

- E. *Contractor*: The electrical contractor and any of his subcontractors, vendors, suppliers, or fabricators.
- F. *EPDM*: Ethylene-propylene-diene terpolymer rubber
- G. *Exposed*: Not installed underground or *concealed* as defined above.
- H. *Finished Spaces*: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceiling, unexcavated spaces, crawl spaces, and tunnels.
- I. *Furnish and install or provide*: To supply, erect, install, and connect to complete for readiness for regular operation, the particular work referred to.
- J. *Location, Damp*: Locations protected from water and not subject to saturation with water or other liquids, but subject to moderate degrees of moisture. Examples of such locations include interior locations such as basements, crawlspaces, attics, cold-storage rooms, etc...
- K. *Location, Dry*: A location not normally subject to dampness or wetness. A dry location may temporarily be subject to dampness or wetness during building construction.
- L. *Location, Wet*: Locations subject to saturation with water or other liquids, locations exposed to weather, and installations underground or in concrete slabs or masonry in direct contact with the Earth. Examples of such locations include all exterior locations (including those under canopies, roofed open porches, etc...) commercial kitchens, and vehicle washing areas.
- M. *NBR*: Acrylonitrile-butadiene rubber.
- N. *Review*: Limited observation or checking to ascertain general conformance with design concept of the work and with information given in contract documents. Such action does not constitute a waiver or alteration of the contract requirements.

1.13 RECORD DRAWINGS

- A. Upon completion of the electrical installations, the Contractor shall deliver to the Architect one complete set of prints of the electrical Contract Drawings which shall be legibly marked in red pencil to show all changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings.
- B. Contractor shall incorporate all sketches, addendums, value engineering, change orders, etc., into Record Drawings prior to delivering the same to the Architect.

1.14 WARRANTY

- A. Contractor's attention is directed to warranty obligations contained in the General Conditions.
- B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of equipment manufacturer's warranties shall be included in the operations and maintenance manuals.

- C. The Contractor guarantees for a two year period from the time of final acceptance by the Owner:
1. That the work contains no faulty or imperfect material or equipment or any imperfect, careless, or unskilled workmanship.
 2. That all work, equipment, machines, devices, etc. shall be adequate for the use to which they are intended, and shall operate with ordinary care and attention in a satisfactory and efficient manner.
 3. That the Contractor will re-execute, correct, repair, or remove and replace with proper work, without cost to the Owner, any work found to be deficient. The contractor shall also make good all damages caused to their work or materials in the process of complying with this section.
 4. That the entire work shall be water-tight and leak-proof.

1.15 OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall have prepared three (3) copies of the Operations and Maintenance Manuals and deliver these copies of the Manuals to the Owner. The Manuals shall be as specified herein. The manuals must be approved and will not be accepted as final until so stamped.
- B. The Manuals shall be bound in a three-ring loose-leaf binder similar to National No. 3881 with the following title lettered on the front: *Operations and Maintenance Manuals – Delaware State Police Troop #1 Modifications - Electrical*. No sheets larger than 8-1/2 inches x 11 inches shall be used, except sheets that are neatly folded to 8-1/2 inches x 11 inches and used as a pull-out. Provide divider tabs and table of contents for organizing and separating information.
- C. Provide the following data in the Manuals:
1. As first entry an approved letter indicating the starting/ending time of Contractor's warranty period.
 2. Maintenance operation and lubrication instructions on each piece of equipment furnished.
 3. Complete catalog data on each piece of electrical equipment furnished including approved Shop Drawing/Submittal with Engineer's Comments (if any).
 4. Manufacturer's extended limited warranties on equipment.
 5. Provide sales and authorized service representatives names, address, and phone numbers of all equipment and subcontractors.
 6. Provide supplier and subcontractor's names, address, and phone number.
 7. Catalog data of all equipment, starters, etc. shall include wiring diagrams, parts list and assembly drawing.
 8. Access panel charts with index illustrating the location and purpose of access panels.

9. Approved Electrical Certificates.
 10. Start-up reports for equipment.
- D. Submit Operations and Maintenance Manuals prior to anticipated date of Substantial Completion for Engineer review and approval. Substantial Completion requires that Operations and Maintenance Manuals be reviewed and approved.
 - E. Deliver all instruction materials to the Owner prior to the formal instruction period.
 - F. Upon completion of all work, thoroughly instruct the Owner's representatives in the proper operation and maintenance of all electrical equipment and systems.
 - G. Instructions shall be done only after completed systems have been put into operation and tested for proper operation and performance.
 - H. Instructions shall be given only by experts in the equipment or system and shall include descriptions and demonstrations of procedures of operation, data record keeping, etc.
 - I. Furnish the necessary technicians, skilled workers, and helpers to operate the electrical systems and equipment of the entire project for one 4-hour day.
 - J. Where specified in technical sections, provide longer periods required for specialized equipment.
 - K. Instruct the Owner or designated personnel in operation, maintenance, lubrication, and adjustment of systems and equipment.
 - L. The Operations and Maintenance Manuals shall be available at the time of the instruction period(s), for use by Instructors and Owner personnel.
 - M. Schedule the general and specialized instruction periods for a time agreed upon by the Owner and Engineer

PART 2 PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 1. Minimum Metal Thickness:

- a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
- b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 FOAM DUCT SEALANT

- A. Description: Two-part, high-expansion foam duct sealant to keep water, acids, dust, gases, insects and rodents out of ducts (conduits).
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. American Polywater Corporation
- C. Basis of Design: FST Foam Sealant by American Polywater Corporation.
- D. The foam duct sealant shall be a two-part "blown" urethane foam with 98% closed cell content.
- E. The foam duct sealant shall have a compressive strength of 300 pounds (ASTM D1691), a tensile strength of 250 pounds (ASTM D1623), and a flexural strength of 450 pounds (ASTM D790).
- F. The foam duct sealant shall be compatible with common cable jacket materials. The cured foam shall be an inert solid that does not affect jacket materials.
- G. The foam duct sealant shall withstand temperatures from -20 degrees Fahrenheit to 200 degrees Fahrenheit and shall not lose function in direct sunlight.
- H. The foam duct sealant shall be chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons.
- I. The foam duct sealant shall foam and react in five to ten minutes at 70 degrees Fahrenheit.
- J. When installed, the sealant shall be capable of holding 7.25 psi air pressure continuously (equivalent of 16.4 feet water-head pressure).

PART 3 EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- F. Include any and all items required by the National Electrical Code and/or field conditions for the proper connection and installation of each piece of equipment.
- G. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY & SECURITY PENETRATIONS

- A. Penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
- G. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements of Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements of Division 26 Section "Electrical Firestopping".

- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals. Seal interior of each raceway with Foam Duct Sealant as specified herein.
- N. Cut sleeves to length for mounting flush with both surfaces of walls.

3.3 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety & security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 26 Section "Electrical Firestopping".

3.4 SUPPORTS, HANGERS AND FOUNDATIONS

- A. Provide supports, hangers, braces, attachments and foundations required for the work. Support and set the work in a thoroughly substantial and workmanlike manner without placing strains on materials, equipment, or building structure, submit shop drawings for approval. Coordinate all work with the requirements of the structural division.
- B. Supports, hangers, braces, and attachments shall be standard manufactured items or fabricated structural steel shapes. All interior hangers shall be galvanized or steel with rust inhibiting paint. All exterior hangers shall be constructed of stainless steel utilizing stainless steel rods, nuts, washers, bolts, etc.
 - 1. Determine exact location of all equipment and supports after Shop Drawings of equipment have been approved.

3.5 PROVISIONS FOR ACCESS

3.5

- A. The Contractor shall provide access panels and doors for all concealed equipment, and other devices requiring maintenance, service, adjustment or manual operation.
- B. Where access doors are necessary, furnish and install manufactured painted steel door assemblies consisting of hinged door, key locks, and frame designed for the particular wall or ceiling construction. Properly locate each door. Door sizes shall be a 12 inches x 12 inches for hand access, 18 inches x 18 inches for shoulder access and 24 inches x 24 inches for full body access where required. Review locations and sizes with Architect prior to fabrication. Provide U.L. approved and labeled access doors where installed in fire rated walls or ceilings. Doors shall be Milcor Metal Access Doors as manufactured by Inland-Ryerson, Mifab, or approved equal.

1. Acoustical or Cement Plaster: Style B
2. Hard Finish Plaster: Style K or L
3. Masonry or Dry Wall: Style M

- C. Where access is by means of liftout ceiling tiles or panels, mark each ceiling grid using small color-coded and numbered tabs. Provide a chart or index for identification. Place markers within ceiling grid not on ceiling tiles.
- D. Access panels, doors, etc. described herein shall be furnished under the section of specifications providing the particular service and to be turned over to the pertinent trade for installation. Coordinate installation with installing contractor. All access doors shall be painted in baked enamel finish to match ceiling or wall finish.
- E. Submit shop drawings indicating the proposed location of all access panels/doors. Access doors in finished spaces shall be coordinated with air devices, lighting and sprinklers to provide a neat and symmetrical appearance.
- F. Provide sufficient access and working space for repair and maintenance about all lighting and electrical equipment to permit ready and safe operation and maintenance of such equipment OSHA 29 CFR 1910 Subpart D and 1910.303(g).

3.6 PAINTING AND FINISHES

- A. Provide protective finishes on all materials and equipment. Use coated or corrosion-resistant materials, hardware and fittings throughout the work. Paint bare, untreated ferrous surfaces with rust-inhibiting paint. All exterior components including supports, hangers, nuts, bolts, washers, vibration isolators, etc. shall be stainless steel.
- B. Clean surfaces prior to application of insulation, adhesives, coatings, paint, or other finishes.
- C. Provide factory-applied finishes where specified. Unless otherwise indicated factory-applied paints shall be baked enamel with proper pretreatment.
- D. Protect all finishes and restore any finishes damaged as a result of work under Division 26 to their original condition.
- E. The preceding requirements apply to all work, whether exposed or concealed, as defined herein.
- F. Remove all construction marking and writing from exposed equipment, ductwork, piping and building surfaces. Do not paint manufacturer's labels or tags.
- G. All exterior equipment and conduits shall be painted in color as selected by Architect.
- H. All exposed conduit, boxes, equipment, etc. in finished spaces shall be painted. Colors shall be as selected by the Architect and conform to ANSI Standards.

3.7 COLOR SELECTION

- A. Color of finishes shall be as selected by the Architect.

3.8 PROTECTION OF WORK

- A. Protect work, material and equipment from weather and construction operations before and after installation. Properly store and handle all materials and equipment.
- B. Cover temporary openings in conduits and equipment to prevent the entrance of water, dirt, debris, or other foreign matter. Deliver conduits with factory applied end caps.
- C. Cover or otherwise protect all finishes.
- D. Replace damaged materials, devices, finishes and equipment.
- E. Protect stored conduits from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, where stored inside.

3.9 OPERATION OF EQUIPMENT

- A. Clean all systems and equipment prior to initial operation for testing, or other purposes. Lubricate, adjust, and test all equipment in accordance with manufacturer's instructions. Do not operate equipment unless all proper safety devices or controls are operational. Provide all maintenance and service for equipment that is authorized for operation during construction.
- B. Where specified, or otherwise required, provide the services of the manufacturer's factory-trained servicemen or technicians to start up the equipment. Where factory start-up of equipment is not specified, provide field start-up by qualified technician.
- C. Submit factory start-up sheets or field start-ups sheets for all equipment prior to the commencement of testing.
- D. Upon completion of work, clean and restore all equipment to new conditions; replace expendable items.

3.10 TESTING AND ADJUSTMENT

- A. Perform all tests which are specified or required to demonstrate that the work is installed and operating properly. Where formal tests are required, give proper notices and perform all necessary preliminary tests to assure that the work is complete and ready for final test.
- B. Adjust all systems, equipment and controls to operate in a safe, efficient and stable manner.
- C. On all circuits, 600 volts or less, provide circuits that are free from ground faults, short circuits and open circuits.
- D. Other tests of a specific nature for special equipment shall be as specified under the respective equipment.
- E. Submit all test results to the Architect/Engineer for approval.

3.11 WALL AND FLOOR PENETRATIONS

- A. All penetrations of walls, ceilings, roofs and floors by or conduit under Division 28 shall be sleeved, sealed, and caulked airtight for sound and air transfer control. Penetrations of walls, ceilings, and floors shall be as specified herein.
- B. All penetrations of fire rated assemblies shall be sleeved, sealed, caulked and protected to maintain the rating of the wall, roof, or floor. Fire Marshal approved U.L. assemblies shall be utilized. See Division 26 Section, "Electrical Firestopping".
- C. Where penetrating through exterior walls or below grade, provide waterproof pipe penetration seals, as specified in another division of these specifications.
- D. Provide conduit escutcheons for all exposed conduit penetrations in finished interior spaces and all exposed exterior penetrations. Escutcheons shall match those provided under Division 23.
- E. Conduit sleeves:
 - 1. Galvanized steel pipe, standard weight where pipes are exposed and roofs and concrete and masonry walls. On exterior walls provide anchor flange welded to perimeter.
 - 2. Twenty-two (22) gauge galvanized steel elsewhere.

3.12 EQUIPMENT BY OTHERS

- A. This Contractor shall make all system connections required to equipment furnished and installed under other divisions or furnished by the Owner. Connections shall be complete in all respects to render this equipment functional to its fullest intent.
- B. It shall be the responsibility of the supplier of the equipment to furnish complete instructions for connections. Failure to do so will not relieve the Contractor of any responsibility for improper equipment operation.

3.13 OUTAGES

- A. Provide a minimum of fourteen (14) days notice to schedule outages. The Contractor shall include in their bid outages and/or work in occupied areas to occur on weekends, holidays, or at night. Coordinate and get approval of all outages with the Owner.
- B. Submit *Outage Request Form*, attached at the end of this Section, to Owner for approval.

3.14 CUTTING AND PATCHING

- A. Accomplish all cutting and patching necessary for the installation of work under Division 26. Damage resulting from this work to other work already in place, shall be repaired at Contractor's expense. Where cutting is required, perform work in neat and workmanlike manner. Restore disturbed work to match and blend with existing construction and finish, using materials compatible with the original. Use mechanics skilled in the particular trades required.
- B. Do not cut structural members without approval from the Architect or Engineer.

3.15 PENETRATION OF WATERPROOF CONSTRUCTION

- A. Coordinate the work to minimize penetration of waterproof construction, including roofs, exterior walls, and interior waterproof construction. Where such penetrations are necessary, furnish and install all necessary curbs, sleeves, flashings, fittings and caulking to make penetrations absolutely watertight.
- B. Where conduits penetrate roofs, flash pipe with Stoneman *Stormtite*, Pate or approved equal, roof flashing assemblies with skirt and caulked counter flashing sleeve.
- C. Furnish and install pitch pockets or weather tight curb assemblies where required.
- D. Furnish and install curbs, vent assemblies, and sleeves specifically designed for application to the particular roof construction, and install in accordance with the manufacturer's instructions. The Contractor shall be responsible for sleeve sizes and locations. All roof penetrations shall be installed in accordance with manufacturer's instructions, the National Roofing Contractors Association, SMACNA, and as required by other divisions of these specifications.

3.16 CONNECTIONS AND ALTERATIONS TO EXISTING WORK

- A. Unless otherwise noted on the Drawings, where existing electronic safety & security work is removed, including hangers, to a point below finished floors or behind finished walls and capped, such point shall be far enough behind finished surfaces to allow for installation of normal thickness of required finish material.
- B. Where work specified in Division 28 connects to existing equipment, conduits, etc., Contractor shall perform all necessary alterations, cuttings, fittings, etc., of existing work as may be necessary to make satisfactory connections between new and existing work, and to leave completed work in a finished and workmanlike condition.
- C. Where the work specified under Division 28, or under other Divisions, requires relocation of existing equipment, conduit etc., Contractor shall perform all work and make necessary changes to existing work as may be required to leave completed work in a finished and workmanlike condition. Where existing insulation is disturbed, replace insulation where removed or damaged equal to existing, in type, thickness, density, finish and thermal resistance (R-value) value.
- D. Where the relocation of existing equipment is required for access or the installation of new equipment, the contractor shall temporarily remove and/or relocate and re-install as required to leave the existing and new work in a finished and workman like condition.

3.17 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.

3. To allow right of way for piping and conduit installed at required slope.
 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
 5. To provide working space and dedicated space clearances per NEC.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in this Section, Article "Provisions for Access".
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 26 Section "Electrical Firestopping".

END OF SECTION

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OUTAGE REQUEST

DATE APPLIED: _____ BY: _____

DATE FOR OUTAGE: _____ FIRM: _____

START OUTAGE-TIME: _____ DATE: _____

END OUTAGE - TIME: _____ DATE: _____

AREAS AND ROOMS: _____

FLOOR(S): _____

AREA(S): _____

ROOM(S): _____

WORK TO BE PERFORMED: _____

SYSTEM(S): _____

REQUEST APPROVED BY: _____
(FOREMAN OR OTHER PERSON IN CHARGE)

(FOR OWNER'S USE ONLY):

APPROVED: _____

YES ___ NO ___ BY: _____ DATE: _____

DATE/TIME-AS REQUESTED: _____ OTHER : _____

OWNER'S PRESENCE REQUIRED: _____

YES: ___ NO: ___ NAME: _____

POINT OF CONTACT: _____ PHONE: _____

**DIVISION 28
SECTION 28 31 12
FIRE ALARM SYSTEM – EXISTING SYSTEM ADDITIONS
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SECTION 28 31 12 FIRE ALARM SYSTEM – EXISTING SYSTEM ADDITIONS

PART 1 GENERAL

1.1 GENERAL

- A. This section of the specification includes the furnishing, assembly, construction, installation, re-connection and testing of a complete fire alarm system as described herein and on the drawings. The system is subject to the requirements of the “Common Work Results for Electrical” section of this specification.
- B. All related work specified in other sections shall be properly coordinated with the fire alarm equipment.
- C. The modifications to the system shall include all wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, alarm initiating devices, alarm indicating devices, and control equipment, and all other accessories and miscellaneous items required for an operating system.
- D. Qualification of Installer: The system shall be installed by an electrical contractor experienced in the installation of the fire alarm system. The services of a technician provided by the control equipment manufacturer shall be provided to supervise installation, adjustment, and tests and final connections of the system.

1.2 APPLICABLE PUBLICATIONS

- A. Unless otherwise indicated, the system and its components specified, and their installation and operation shall conform to the latest applicable requirements of the following publications:
 - 1. National Fire Protection Association (NFPA):
 - NFPA 70 National Electrical Code
 - NFPA 72 National Fire alarm and Signaling Code
 - NFPA 72E Automatic Fire Detectors
 - NFPA 90A Air Conditioning and Ventilating Systems
 - NFPA 72A Standard for the Installation, Maintenance and Use of Local Protection Signaling Systems
 - NFPA 101 Codes for Life Safety from Fire in Buildings and Structures
 - 2. Underwriters Laboratories (UL):
 - Fire Protection Equipment Directory
 - Electrical Construction Materials Directory
 - 3. State of Delaware – Office of the State Fire Marshal, Fire Prevention Code.
 - 4. American Insurance Association Fire Protection Code (Article 14)

5. Basic Building Code of the Building Officials and Code Administration International, Inc. (Article 12)
 - B. Acceptable evidence of compliance of components is a UL or FM label or listing or an independent certification, satisfactory to the Engineer, that the components meet the applicable standards.
- 1.3 SCOPE
- A. WORK INCLUDED
 1. Relocate existing fire alarm system wiring devices as indicated on the drawings.
 2. Provide all required upgrades to the existing fire alarm system equipment to accommodate the relocated fire alarm devices.
 3. All fire alarm devices shall be connected to the existing Fire Alarm System.

PART 2 PRODUCTS

2.1 FIRE ALARM DEVICES

- A. Reinstall existing products removed during the demolition phase of the project.

PART 3 EXECUTION

3.1 GENERAL

- A. Reinstall the device to the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC -Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 A and B. Upon completion, the contractor shall so certify in writing to the owner and general contractor. All junction boxes shall be sprayed red and labeled *Fire Alarm*. Wiring color code shall be maintained throughout the installation.
- B. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.
- C. Ensure that the final mounting location will provide convenient access to the enclosure for maintenance.

3.2 SYSTEM TESTING

- A. The completed fire alarm system shall be fully tested by the contractor and the manufacturer's NICET CERTIFIED technical representative in the presence of the owner's representative. Upon completion of a successful test, the contractor shall so verify in writing to the Owner, and general contractor.

- B. The following test shall be performed by the Fire Alarm Manufacturer's authorized representative. Each and every device shall be tested for its intended function. Verify that each device is located in its appropriate location. Written verification of this test shall be provided to the owner, architect, and general contractor. This test shall be performed in accordance with NFPA 72 National Fire Alarm Code.
- C. The fire alarm supplier shall own and maintain a smoke detector analyzer for on site sensitivity testing of smoke detectors per NFPA. The analyzer shall be made available to the owner for such tests.

3.3 WARRANTY

- A. The equipment and wiring shall be warranted to be free from electrical and mechanical defects for a period of two (2) years commencing with start-up and owners beneficial use of any portion of the system. Warranty shall include all labor/travel time and parts.

END OF SECTION

CANNOT BE USED FOR BIDDING